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ADDISONIA

**COLORED ILLUSTRATIONS
AND
POPULAR DESCRIPTIONS
OF
PLANTS**

**VOLUME 4
1919**



**PUBLISHED BY
THE NEW YORK BOTANICAL GARDEN
(ADDISON BROWN FUND)**

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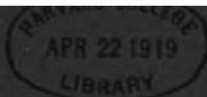
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MARCH, 1919



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THE NEW YORK BOTANICAL GARDEN
(ADDISON BROWN FUND)

MARCH 31, 1919



*J. Pierpont Morgan,
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ANNOUNCEMENT

A bequest made to the New York Botanical Garden by its late President, Judge Addison Brown, established the

ADDISON BROWN FUND

"the income and accumulations from which shall be applied to the founding and publication, as soon as practicable, and to the maintenance (aided by subscriptions therefor), of a high-class magazine bearing my name, devoted exclusively to the illustration by colored plates of the plants of the United States and its territorial possessions, and of other plants flowering in said Garden or its conservatories; with suitable descriptions in popular language, and any desirable notes and synonymy, and a brief statement of the known properties and uses of the plants illustrated."

The preparation and publication of the work have been referred to Dr. John H. Barnhart, Bibliographer, and Mr. George V. Nash, Head Gardener.

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CHAMAECRISTA DEERINGIANA

CHAMAECRISTA DEERINGIANA**Deering's Partridge-pea***Native of southern Florida*

Family CAESALPINIACEAE

SENNA Family

Chamaecrista Deeringiana Small & Pennell; Pennell, Bull. Torrey Club 44: 345. 1917.

A perennial with few or several clustered or approximate stems borne on a stout horizontal rootstock. The stems are erect or nearly so, a yard tall or less, relatively slender, purple, purplish, or red-tinged, ultimately glabrous or finely appressed-pubescent, especially above, usually simple, sometimes with few lax branches, and commonly slightly zigzag. The stipules are lanceolate or subulate-lanceolate, a half inch long or less, prominently ribbed, slender-tipped. The leaves are rather numerous, with pinnately compound blades. The petioles are a quarter of an inch long or less, finely pubescent, each with a brown ovoid or elliptic discoid gland on the upper side, above or below the middle. The leaf-rachis is elongate, glandless, otherwise similar to the petiole. The leaflets are borne in mostly ten to twenty pairs; the blades are linear to linear-lanceolate, or, in the case of the lower leaves, sometimes broadened upward, mostly about a half inch long, acute or mucronate, glabrous, shining, and when dry rib-veined on either side of the excentric midrib; they are oblique at the rounded base which is articulated to a cushion-like petiolule. The flowers are borne in fascicles which terminate very short superaxillary branches, the peduncles two to four together, or sometimes solitary, with lanceolate to subulate-lanceolate bracts which resemble the stipules. The calyx is glabrous or nearly so, bright green; the five lobes are slightly unequal, narrowly lanceolate, acuminate, a half inch long or less. The petals are bright yellow, broadly obovate, the standard an inch long or less, the other petals shorter than the standard, and all somewhat concave, short-clawed or nearly sessile, the two lower ones each with a pair of brown spots at the base. The stamens, numbering ten, are borne on an annular disk. The filaments are very short and stout, mostly about one twenty-fourth of an inch long. The anthers are subulate, except the slightly enlarged and lobed apex, curved, glabrous, yellow or reddish, or yellow below and brown at the tip. The gynoecium exceeds the stamens in length; the ovary is decurved, linear above the abruptly bent and slightly swollen base, finely appressed-pubescent; the style is filiform, curved, glabrous, except the base; the stigma is minute. The pod is linear, usually narrowly so, one and a half to three and a half inches long, brown, thick-walled, rather thick-margined, scarcely stipitate, with a very short stout slightly curved beak.

The seeds are rhombic, a sixth of an inch long or less, dark purple-brown, with irregular lines of glands on the sides, abruptly contracted into a blunt tip at the base.

As late as the last decade of the last century only two kinds of partridge-pea or wild sensitive-plant were generally recognized as growing in the United States. All the plants were grouped under two species, one with small flowers and one with large. As plant collectors increased in number and began to push out beyond the limits of the better botanically known portion of the United States represented by our northeastern seaboard, many plants differing decidedly from those before known were brought to light. One species after another of *Chamaecrista* has been discovered and described, until at the present time more than a dozen well marked species are generally recognized by systematic botanists; over half of these grow naturally in Florida.

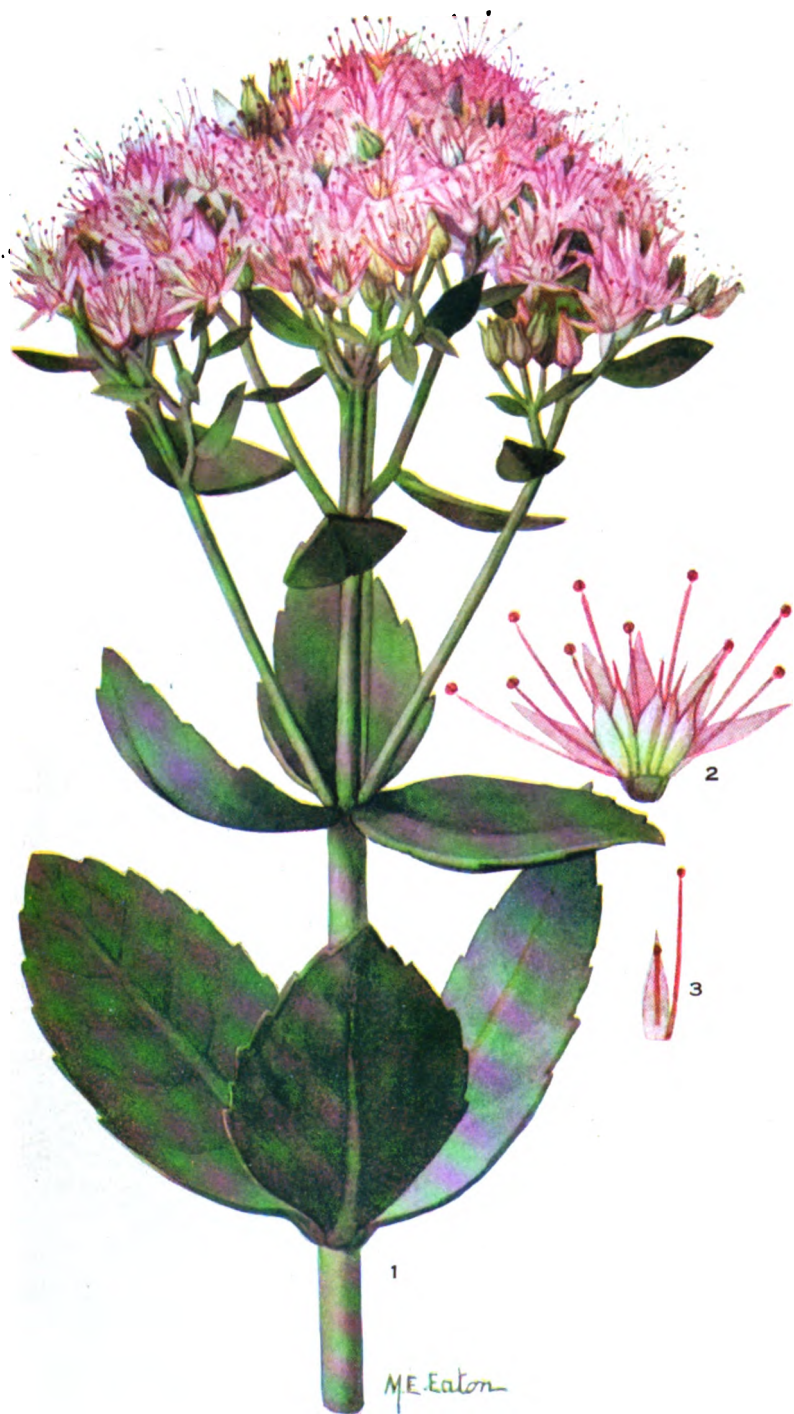
The first specimens of the species under consideration were collected in 1901. Less than a decade earlier a large partridge-pea native in southern Georgia and Florida, an annual, commonly growing to be more than two yards in height, and with a tap root, was described as *Chamaecrista brachiata*. Deering's partridge-pea was at first confused with the annual just referred to. However, its characters soon became evident; the most prominent one is the stout elongated horizontal rootstock, which is quite an exception in this genus. It is thus a perennial instead of an annual, and although it is neither as tall nor as much branched as *C. brachiata*, it is the largest flowered and most beautiful of our partridge-peas or wild sensitive plants.

Like a large number of plants inhabiting the pine-woods where forest fires have been frequent for ages, the plant here illustrated in all probability assumed the habit of burying its main stem (rootstock) beneath the surface of the ground. On the one hand it is thus not in danger of being exterminated by fires sweeping through the woods, and on the other a forest fire seems to increase its vigor, for the plants growing on areas recently burned over present a much more healthy appearance than those growing where fire has not as recently swept the vegetation.

The specimens from which the accompanying plate was made were collected by the writer in the pinelands on the reservation of Mr. Charles Deering at Cutler, Florida, May 3, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Rootstock. Fig. 3.—Flower, sepals and petals removed, $\times 2$. Fig. 4.—Pod.



SEDUM SPECTABILE

SEDUM SPECTABILE

Showy Sedum

Native of Japan?

Family CRASSULACEAE

ORPINE Family

Sedum spectabile Boreau, Mém. Soc. Acad. Maine-et-Loire 20: 116. 1866.

A perennial herb, of robust, bushy habit, with erect fleshy stems, one and a half to two feet high, bearing glaucous green leaves and clusters of usually pink flowers. The fleshy leaves are usually in whorls of three, sometimes opposite, the lower ones two inches wide and three inches long, the upper slightly smaller; they are ovate to spatulate, wedge-shaped at the base, and their margins are toothed. The leaves of the inflorescence are small and entire. The flowers are numerous, in flat-topped, leafy cymes; their color is usually pink, varying somewhat to white and purple. The sepals are greenish, lanceolate, and acute, and are about one third the length of the five lanceolate, spreading petals. The stamens are ten in number, five of them short and attached to the petals near the base, the other five nearly twice as long and alternate with the petals; the filaments are white or pink and the anthers orange. The ovary has five cells, which ripen into five free follicles.

The showy sedum has been in cultivation since about 1860, under various names given to it by horticulturists. It was first described by Boreau in 1866. The original plants were said to have been introduced from Japan, but late records of the flora of that country do not include *Sedum spectabile*, so its nativity is uncertain. Perhaps this species is identical with the one cultivated by Vilmorin before 1860, under the name *Sedum Fabaria*. It is one of the bushy, robust sedums, closely related to the live-for-ever, *S. triphyllum*.

Although adapted to greenhouse culture, *Sedum spectabile* is best grown in the herbaceous border; it likes a rather sandy soil and a sunny location. Broad masses in the center of a border make a sea of pink bloom in September, which attracts hundreds of butterflies and other flying visitors. Propagation is readily effected by seeds, cuttings, or division of the clumps.

The plant from which the illustration was prepared has been in the collections of the New York Botanical Garden for many years.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Flower, cut open, exposing the pistils, $\times 3$. Fig. 3.—Petal, with stamens, $\times 2$.



CRATAEGUS SUCCULENTA

CRATAEGUS SUCCULENTA**Long-spined Thorn***Native of the northeastern United States and Nova Scotia*

Family MALACEAE

APPLE Family

Crataegus succulenta Schrad.; Link, Handb. 3: 78. 1831.

A shrub or small tree of broad irregular habit and with ascending branches, sometimes up to twenty-five feet tall, with gray bark and shining chestnut-brown twigs; the numerous chestnut-brown thorns are up to four inches long. The dark green leaves have petioles from a quarter to three quarters of an inch long. The blades are coriaceous, shining and glabrous above, usually slightly pubescent beneath, have an obovate or rhombic-ovate outline, and measure up to three and a half inches long and two and a half inches wide; they are acute at the apex and wedge-shaped at the base, with the margins doubly toothed, except at the very base, and lobed above the middle. The flowers, which are a little less than an inch in diameter, are in pubescent corymbs of a dozen or less; the calyx is hairy, and its lobes lanceolate, long-pointed and with gland-tipped teeth. The white petals are orbicular or nearly so. The stamens, varying from ten to twenty, are usually ten, with their large anthers pink or yellow. The styles are two or three. The globose pubescent fruit is of a dark red color and shining, and has a diameter of two thirds of an inch or less; its yellow flesh is sweet and pulpy and contains two or three nutlets, each about a quarter of an inch long, ridged on the back, and with the inner surfaces deeply pitted.

This is one of the earliest fruiting as it is one of the most attractive of our American thorns. As it grows in the New York Botanical Garden it has a compact form, inclined to be shrubby rather than tree-like, and is of rather slow growth. It bears an abundance of fruit, of a rich dark red, which makes of it, in the early fall, one of the most striking and handsome of our American plants. This showy fruit and the rather dwarf habit, with a well-marked outline, make it of especial decorative value. The specimen from which our illustration was prepared was raised in the New York Botanical Garden from seed collected in Vermont by W. W. Eggleston.

The genus *Crataegus* is widely distributed, mainly in the temperate regions of the northern hemisphere, but finds its greatest development in America; here it extends southward into Mexico and South America along the highlands. But eastern North America is the center of its distribution, where it ranges as far north as Newfoundland; there are also a few species in the Rocky Mountain

states and on the Pacific slope. They are in their greatest abundance, not only as to kinds but also as to individuals, in the limestone formations of the St. Lawrence and Great Lakes regions, and in those of the Missouri-Arkansas region, but few growing near the Atlantic coast.

Up to the end of the nineteenth century there were less than a hundred species of thorns known. With the advent of the twentieth century, however, there was great activity in the study of these plants, an activity so great that in the first decade about one thousand North American species were proposed, many of them based upon such trivial and variable characters that it is impossible to maintain them. When a rational treatment of this genus makes its appearance the list of synonyms must of necessity be extremely large, adding greatly to the confusion already existing in this difficult group.

The thorns are well adapted for hedges, borders, and screens, their rigid thorn-beset branches making an excellent barrier against both animal and man, and their showy flowers and handsome fruits giving them great decorative value. When in flower they are covered with a mantle of white bloom, providing, if care be taken in selecting species of different flowering periods, a mass of flowers from the middle of May to the middle of June. Some of the forms ripen their fruit late in August or early September, while others mature theirs much later, giving the thorns a wide range of decorative possibilities. The fruit is of recognized economic importance in some localities, being used in the preparation of preserves and jellies. When the wonderful development of the common apple is considered, the possibilities of improvement in the thorns are promising.

Propagation is effected commonly by seeds, but hybrid forms and those with double flowers may be propagated by grafting. The seeds of some species germinate the first year, while in others two years are required.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Fruiting branch. Fig. 2.—Flowering branch.



LIMODORUM SIMPSONII

LIMODORUM SIMPSONII**Simpson's Grass-pink***Native of Florida, the Bahamas, and Cuba*

Family ORCHIDACEÆ

ORCHID Family

Limodorum Simpsonii Small, Fl. SE. U. S. 322. 1903.

Plants erect, a yard tall or less, bright green, glabrous. The leaves are usually three: the first is a short sheathing scale, the second a long sheathing scale, each of them obliquely opened at the top; while the third has a sheathing base larger than the first and the second and terminates in an elongate linear blade. The blade is erect or nearly so, a quarter of an inch wide or less, often slightly involute, somewhat fleshy, acuminate at the apex, with three to five prominent ribs and more slender intervening ones. The scape, usually exceeding the leaf in length, is wand-like, terminating in a more or less zigzag inflorescence-rachis which bears lanceolate to ovate bracts at the nodes. The flowers are conspicuous, usually few to several on a rachis, sometimes as many as thirty or forty, the parts predominantly rose-purple or pink, or rarely white. The median sepal is elliptic, about one inch long or less, abruptly short-acuminate; the lateral sepals are broader and shorter than the median one, inequilateral, and abruptly pointed. The petals are about as long as the median sepal, but with more nearly parallel sides, and usually obtuse. Each sepal and petal has five to nine parallel veins, which are connected by distant cross-veinlets. The lip is about five-eighths of an inch long, with two small rounded lateral lobes and a large middle lobe which has a broad obreniform apex, apiculate in the sinus, terminating a narrow stalk-like base. The column is paddle-shaped, with a stalk arising at the base of the lip and dilated into a rhombic or obovate-rhombic blade near the apex, where the anther and the stigma are situated. The capsules are ellipsoid, about three quarters of an inch long, sessile, but sometimes with a very short stipe-like base, appressed to the rachis and subtended by the persistent bracts. The seeds are minute and very numerous.

The Everglades of Florida have only two kinds of showy terrestrial orchids. The one under consideration is the smaller plant, but the more conspicuous of the two. It is widely distributed in the "glades" but more abundant near the edges, where the ground is dry for a considerable part of each year, than it is in the interior.

It flowers nearly throughout the year, at least in different parts of the Everglades. It occurs either as scattered plants or in large colonies; in the latter case the bright rose-purple flowers are very

conspicuous against the green herbage of the surrounding vegetation.

This plant, although seldom collected previous to the beginning of this century, was persistently confused with the common northern grass-pink, *Limodorum pulchellum*, which is also an inhabitant of wet grounds. There are four other species in the southern states, particularly in Florida, but they inhabit the pinelands.

The specimens on which this species was founded were collected in southern Florida by J. H. Simpson in 1892. We have specimens collected on Andros by Mr. and Mrs. Northrop in 1890. The earliest collection of this plant seems to be that of Charles Wright made in western Cuba in the early sixties of the last century. In the West Indies, as in Florida, *Limodorum Simpsonii* is an inhabitant of marshes and savannahs.

The specimens from which the accompanying illustration was made were collected by the writer in the Everglades between Florida City and Bay Biscayne, April 29, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Base of stem. Fig. 2.—Inflorescence. Fig. 3.—Lip and column. Fig. 4.—Fruit.



CELASTRUS ARTICULATUS

CELASTRUS ARTICULATUS**Japanese Shrubby Bitter-sweet***Native of Japan and China*

Family CELASTRACEÆ

STAFF-TREE Family

Celastrus articulatus Thunb. Fl. Jap. 97. 1784.*Celastrus orbiculatus* Lam. Tab. Encyc. 2: 94. 1797.

A vigorous high-climbing shrub, bearing rather inconspicuous greenish flowers and numerous golden-yellow fruits which burst open, exposing the red arils of the seeds. Stems up to twenty feet long, with the bark of the branches purplish or purplish gray and that of the alternate widely spreading twigs purplish or yellowish brown. The glabrous leaves are alternate, with petioles a half to three quarters of an inch long. The blades are oblong, elliptic, or obovate, to nearly orbicular, up to three inches long, abruptly terminating in a short blunt point, acute at the base; the margin is crenate-serrate. The flowers are borne in few-flowered short-stalked cymes in the leaf-axils; the erect calyx-lobes, spreading petals, and stamens are in fives; the linear-oblong petals are much longer than the short rounded lobes of the calyx; in the pistillate flowers the stamens are short and are not fertile. The glabrous ovary (immature in the staminate flowers) is ovate, and is narrowed into a columnar style with three recurved stigmatic lobes. The golden-yellow capsule is about the size of a pea and splits into three valves, exposing the red arils of the seeds. The seeds are broadly ellipsoid or nearly globose, brown.

One of the most vigorous of the woody hardy cultivated vines, and related to our own shrubby bitter-sweet, *Celastrus scandens*; but it is readily distinguished by the flower-clusters borne in the axils of the leaves instead of at the ends of the branchlets, as in that species. It is very showy in fruit, the yellow of the opened capsule making a striking combination with the red of the arils. The fruit, however, does not become conspicuous until the fall of the leaves, whereas in our native species the fruit-clusters are borne on the ends of the branchlets and so are plainly visible even while the foliage is present. This plant is also of more vigorous growth than *Celastrus scandens*, and is well adapted for covering walls, old trees, stony waste places, and other unsightly objects.

The drawing was prepared from a vine growing on some small trees in the rear of the Museum building of the New York Botanical Garden. It was of accidental occurrence there, and perhaps originated from seed carried by the birds from the large specimen in

the viticetum but a short distance to the east. That vine was raised from seed secured in 1897 from the Royal Gardens, Kew, England.

The genus *Celastrus*, containing about thirty six species, is widely distributed in the tropical and temperate regions, except Europe. They are all woody, and for the greater part twining vines. Only one species, *Celastrus scandens*, is known from continental North America; there are a few in tropical America, including the West Indies, a few others in Africa and Australia, but the great majority of the species occur in eastern Asia.

They may readily be propagated by seeds, or by hard or soft wood cuttings; propagation may also be effected by root cuttings or layers, or by suckers which are freely produced.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Fruiting branch. Fig. 2.—Branchlet with staminate flowers. Fig. 3.—Staminate flower, $\times 4$. Fig. 4.—Branchlet with pistillate flowers. Fig. 5.—Pistillate flower, $\times 4$.



OKENIA HYPOGAEA

OKENIA HYPOGAEA**Dune-groundnut***Native of Florida and southern Mexico*

Family ALLIONIACEAE

FOUR-O'CLOCK Family

Okenia hypogaea Schlecht. & Cham. Linnaea 5: 92. 1830.

Plants with a stout tap-root from which few or many stems arise. The stems and branches are prostrate, two to seven feet long, radially disposed and thus forming a broad mat. They are tomentose with short and long viscid-glandular hairs, very clammy. The leaves are opposite, sometimes clustered at the nodes, fleshy, very unequal in size. The blades are ovate, a half inch to two and a half inches long, obtuse at the apex, undulate-sinuate, broadly cuneate to cordate at the base, bright green on the upper side, somewhat paler beneath, pubescent with short and long viscid hairs on both sides, but more closely pubescent beneath, closely ciliolate, rather conspicuously ribbed, often prominently so beneath. The petioles are nearly as long as the leaf-blades or shorter, pubescent like the stem and branches. The short-pedicelled flowers are erect, arising from a short-stalked involucre, which resembles a calyx, of three ovate or ovate-lanceolate pubescent bracts. The calyx is very showy, trumpet-shaped; the tube is green or nearly white, viscid-pubescent without; the throat is white or green, glabrous; the limb is bright rose-purple or sometimes deep-blue, an inch to an inch and a quarter in diameter, or much smaller in the later flowers, with the five spreading lobes notched. The stamens are fifteen or fewer, with the capillary filaments white or nearly so at the base, magenta above. The anthers are pale yellow, two-lobed. The ovary is ovoid, terminated with a capillary style which is surmounted with a depressed stigma. The fruits are subterranean, produced from the flowers that have buried themselves by the elongated pedicels which are pubescent near the base and glabrous near the flower and fruit; they are ellipsoid and about five-eighths of an inch long, with a pale or white ten-ribbed pericarp.

One of the numerous surprises in the course of our botanical exploration of southern Florida was the discovery of this plant, not previously known in the coastal region north of southern Mexico. It was found by J. J. Carter and the writer on the sand-dunes opposite Miami, in November, 1903. Curiously enough, it represents the species on which the genus *Okenia* was founded. The original specimens were collected on sand-hills near Veracruz, about the end of the first quarter of the last century by Christian Schiede and Ferdinand Deppe. The plant was little known up to

recent years. It grows in Florida from Soldier Key up the coast to Baker's Haulover about opposite Arch Creek on the mainland.

Like the peanut of commerce (*Arachis hypogaea*), the dune-groundnut buries its flower in the sand and matures its fruits usually four to six inches under the surface. A young plant arises from each fruit as a tuft of leaves with a large deep rose-purple or nearly blue flower. Branches arise from the tuft of leaves, often a dozen or sometimes more. These radiate from the original root and grow to a length of two to six feet or more, and flowers are borne at each node of the branches and branchlets; the earlier are larger than the later ones.

Not only is the plant conspicuous on account of its bright colored flowers, but the leaves, bright green above and silvery-green beneath, make a strong contrast with the sand in which this plant grows. The plant up to the calyx is clothed with clammy-viscid hairs. When the loose sand in which it grows is blown over it, all parts are clothed with the fine grains, which in this case are not silica, but small fragments of sea shells which have been ground up by the surf of the adjacent shore.

The dune-groundnut is very beautiful for a part of each year. There seems to be no regular season for it, plants and colonies appearing according to the times the fruits ripen and the local conditions favorable to their sprouting. Although this plant looks as if it were a perennial, it really is an annual and when its season is past and the leaves have disappeared, there remains a tangled mat of brown branches and branchlets in place of the former beautiful ground cover of green leaves. The specimen from which the accompanying illustration was made was collected by the writer on the sand-dunes near the ocean about seven miles north of Miami, April 30, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Portion of stem, with flowers and fruit. Fig. 2.—Portion of flower, $\times 2$.



MENTZELIA FLORIDANA

MENTZELIA FLORIDANA**Poor-man's Patches***Native of Florida and the Bahamas*

Family LOASACEAE

LOASA Family

Mentzelia floridana Nutt.; T. & G. Fl. N. Am. 1: 532. 1840.

Stems and branches reclining and clambering on other herbs or on shrubs, diffuse, repeatedly dichotomous, finely fluted at maturity, minutely glochidiate-hispid. The leaves are alternate, often quite irregularly placed; the blades are ovate or deltoid and coarsely toothed or lobed and hastate, three fourths of an inch to three and a half inches long. They are bright green, often shining and with impressed veins above, paler, dull, and with prominent veins beneath. The leaf margins are very uneven, with acute or obtuse teeth or lobes; the surfaces are densely clothed when young with scabrous hairs above and more numerous glochidiate and scabrous hairs beneath, less hairy when older. The bases of the leaf-blades are broadly cuneate to subcordate. The petioles are much shorter than the blades; even in the case of the lower leaves they are rarely one half as long as the blades. The flowers, borne in or near the axils of leaves or branches, open in the forenoon. The buds are conic-ovoid and acute. The sepals are lanceolate, one quarter to three eighths of an inch long, concave, involute and thus subulate at maturity, persistent and turning brown. The petals are bright yellow, and sometimes salmon-colored without, broadly cuneate to orbicular-cuneate, three eighths to five eighths of an inch long, usually abruptly pointed at the apex, concave, faintly striate. The stamens are numerous, erect or nearly so, in groups; the filaments are filiform, yellow; the anthers are yellow, often pale. The capsules are nodding or divergent, with obconic bodies which are harshly and usually densely glochidiate-hispid, except at the slightly depressed apex, and narrowed into a short stipe-like base.

The genus *Mentzelia*, named in honor of Christian Mentzel (1622-1701), a European botanist, was founded on a plant collected in the West Indies, perhaps in the seventeenth century; this was the only known member of the genus for many years.

The plant here illustrated was first found in eastern Florida in the early part of the last century by William Baldwin. It was discovered in the northeastern corner of the state, and was later found at the southwestern extremity on Key West. It is common on the Atlantic side, but less common on the Gulf Coast and evidently does not extend as far north there. After the Florida species was named and described, additional species, as well as several

related genera, were discovered in the western United States and adjacent Mexico.

Mentzelia floridana is closely related to the type species, *Mentzelia aspera*, of the West Indies, differing from it, however, rather prominently in the less sharply cut leaf-blades, in the wingless filaments of the outer stamens, and the stockier fruit. All parts of our plant, except the corolla and the essential organs, are covered with barbed (glochidiate) hairs. These cause the stems, leaves and fruits to adhere to one's clothing and to the bodies of hairy animals. So pronounced is the tenacity with which the leaves cling to clothing, that the plant is popularly known in its natural range as poor-man's patch; it is also called stick-leaf. When a leaf becomes attached to clothing it cannot be pulled off as a whole, but must be removed piece by piece. The capsules are thus well adapted for being dispersed by fur-bearing animals.

Its habitat is about hammocks and in clearings in hammocks. In the dune hammocks facing the Gulf Stream this plant assumes quite a different appearance from the form growing in hammocks away from the shore. There the habit of growth and the leaves often closely resemble the shore-sunflower (*Wedelia trilobata*).

The specimens from which the accompanying illustration was made were collected by the writer in Brickell Hammock, Miami, Florida, April 24, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Upper part of stem, with flowers and fruit. Fig. 2.—Leaf.



IPOMOEA TENUISSIMA

IPOMOEA TENUISSIMA**Cuban Morning-glory***Native of southern Florida, Cuba, and Hispaniola***Family CONVULVACEAE MORNING-GLORY Family***Ipomoea tenuissima* Choisy, in DC. Prodr. 9: 376. 1845.

A diffuse tender herbaceous vine, with numerous stems arising from thick perennial roots. The stems and branches are slender, villous-hirsute and somewhat downy, or nearly glabrous in age, usually twining on herbs and low shrubs. The leaves are pubescent like the stem and branches, with the hairs usually prominently pustulate at the base. The blades are very variable in shape, ranging from reniform or ovate to lanceolate or linear, usually sagittate or hastate, mostly one to two inches long, deep green on both sides, but slightly paler beneath, with the broad or narrow basal lobes spreading or recurved. The petioles are slender, as long as the leaf-blades or shorter. The flowers are borne singly, or two or three together in peduncled cymes. The peduncle is much longer than the pedicels, which are subtended by subulate bracts. The green or purple-tinged calyx is five-lobed; the three outer lobes are smaller and narrower than the two inner ones, often pubescent on the back, always ciliate with long hairs which are conspicuously pustulate at the base, acuminate; the inner lobes are larger than the outer, glabrous, except sometimes for cilia near the apex, short caudate-acuminate. The corolla is funnelform, very tender, magenta, paler on the limb than in the throat, one and a half to two inches long, glabrous without, sparingly pubescent within on the lower part of the tube; the limb is often somewhat pentagonal, spreading or with slightly recurved edges. The five stamens are included in the corolla. The filaments are filiform, the lower part of each, usually about one half the filament, adnate to the corolla-tube, the upper portion of the adnate part and the lower portion of the free part softly pubescent with glandular hairs. The anthers are ellipsoid or ovoid-ellipsoid, about one twelfth of an inch long, obtuse. The ovary is ovoid, sessile on an annular disk, with a ring or crown of erect bristle-like hairs above the middle. The style is filiform above a subulate base, glabrous; the two-lobed stigma is papillose. The capsule is subglobose or depressed, a quarter of an inch in diameter or less, short-beaked, pubescent near the top without, glabrous within, seated in the calyx. The seeds are black, glabrous.

Many kinds of morning-glories inhabit Florida, but among all of them the species here illustrated has the most fragile and fugaceous corolla. The flowers open, on fair days, for an hour or two in the forenoon; when the corollas have expanded, a gust of wind or a

light shower of rain will quickly damage them, after which they will soon wilt and disappear.

The vines usually grow prostrate on the rocky floor of the pine-woods and the small leaves are of just about the same color as the eroded and weathered rock. Thus the plant is not readily noticeable, except when the corollas are expanded. Sometimes the stems twine over low shrubs and herbs.

This plant came to our notice on this side of the Gulf Stream when the writer and his associates first entered the "homestead country," thirty odd miles southwest of Miami, in 1903. Previous to this time the plant was definitely known only in Cuba, growing from one end of that island to the other, although it is on record as having been first found in Hispaniola.

In Florida, the Cuban morning-glory is confined naturally to the pinewoods of the Biscayne pineland of the Everglade Keys. Several years ago this plant became naturalized on the Florida Keys, when the roadbed of the Key West Extension of the Florida East Coast Railway was built on some of the islands of the Florida Reef with rock taken from the Everglade Keys on the mainland. Whether or not the plant will survive and maintain itself on the Florida Keys under hammock conditions, instead of in the pine-lands, is a question that remains to be answered.

Under normal soil conditions it is never luxuriant and branches rather sparingly. However, when the roots are imbedded in the artificially broken snow-white lime rock they commonly send out scores of stems which branch freely and thus form large mats supporting great quantities of flowers. We found it growing in this luxuriant form on the Florida Keys.

The specimens from which the accompanying plate was made were collected by the writer on the pinelands west of Cutler, Florida, May 23, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Upper part of flowering stem. Fig. 2.—Leaf. Fig. 3.—Fruit.



FORSYTHIA FORTUNEI

FORSYTHIA FORTUNEI**Fortune's Golden-bell***Native of China*

Family OLEACEAE

OLIVE Family

Forsythia Fortunei Lindl. Gard. Chron. 1864: 412. 1864.

An upright shrub of vigorous habit, the branches finally arching, with the leaves often ternate, and the corollas with spreading twisted segments. The bark of the younger branches is usually a yellowish-brown, sometimes flushed with red. The opposite glabrous leaves, are of a rich dark green above, paler beneath, have petioles a quarter to a half inch long, and are usually simple, or frequently ternate, especially on the vigorous shoots of the season. The blades of the simple leaves are ovate, usually rounded at the base and acute at the apex, the margin serrate, except at the very base; in the ternate leaves, the terminal leaflet is similar, but with a wedge-shaped base, while the lateral leaflets are much smaller, commonly elliptic, often entire, and are obtuse or acute at the apex. The numerous yellow flowers, about an inch long, arise from scaly buds in the axils of the leaves of the previous year; they occur in twos or threes, rarely more or singly, on pedicels commonly less than a quarter of an inch long. The erect sepals are shorter than the tube of the corolla, rounded at the apex, and sometimes ciliate. The deeply parted corolla is of a clear yellow, has four somewhat ascending lobes which are linear-oblong, twisted, and with the apex obtuse or sometimes retuse. The two stamens are short and inserted at the base of the corolla tube. The ovary is superior and bears a slender style, varying in length in different flowers, with a two-lobed stigma. The fruit is a two-celled dehiscent capsule.

One of the first shrubs to bloom in the spring, coming into blossom at the New York Botanical Garden usually the last week in April, and the first of the golden-bells to flower, commonly appearing a day or two ahead of those of *Forsythia intermedia*, a hybrid between this and *Forsythia viridissima*, the last of the trio to bloom. The long wand-like branches have the flowers more scattered than in either of the other two, and generally of a paler color. As a single specimen or in mass it is very effective, especially when placed in front of tall evergreens, the brightness of the flowers standing out vividly against the green.

This species was discovered in the fall of 1861 near Peking, China, by Robert Fortune. Considered here as a species, a treatment certainly to be preferred from the standpoint of the horticulturist, it is by some placed as a variety of *Forsythia suspensa*, the type of

the genus, which was originally described by Thunberg in his *Flora Japonica* as a lilac, under the name *Syringa suspensa*. The plant from which the drawing was prepared has formed for many years a part of the golden-bell group near the Harlem Railroad Station plaza.

The genus *Forsythia* contains four or five species, all but one of which are natives of China, the exception occurring in Albania, a country far removed from the home of the others; at present no other species are known to occur between these widely separated points, an unusual though not unparalleled instance of plant distribution.

Forsythias may be readily propagated by both greenwood and hardwood cuttings, and by seeds. The ends of the branches in drooping forms root when they touch the ground, and new plants of these may be easily obtained by transplanting the rooted branch-tips.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Leaves.



PENSTEMON DIGITALIS

PENSTEMON DIGITALIS**Foxglove Beard-tongue***Native of the southwestern Mississippi Valley*

Family SCROPHULARIACEÆ

FIGWORT Family

Penstemon Digitalis Nutt. Trans. Am. Phil. Soc. II. 5: 181. 1837.

A glabrous herbaceous plant, from a short rootstock sending up one or a few slender stems, each terminating in a panicle of many white flowers. The erect stems are two to four feet tall. The leaves are of two types: those of the winter rosette, in summer persisting at the base of the stem, are prevailingly ovate and petioled; those of the stem itself are narrower and sessile, the upper clasping by a rounded base; all are light-green, slightly paler beneath, with denticulate to nearly entire margins. The panicle, about one third the height of the plant, is rounded-pyramidal, composed of pairs of branches borne in the axils of much reduced bract-like leaves; each branch terminates in two flowers subtended by a pair of bracts, from the axils of which two new branches arise to repeat the process—a peculiar branching usually repeated for several stages further. The flowers are borne on pedicels about one fourth of an inch in length. The five sepals are usually slightly longer than this, lanceolate and long-attenuate, and, like the pedicels, are slightly pubescent with stalked dark brown glands. The corolla is about one inch long; the basal third, the “tube,” is narrow and horizontally flattened; distally from this is the “throat,” strongly inflated, arched posteriorly and slightly two-ridged within anteriorly, with an open mouth; the five corolla-lobes are ovate and rounded, the two posterior, forming the upper lip, upcurved and somewhat spreading, the three anterior deflexed-spreading; the corolla is white throughout, or usually with violet lines within on the anterior side; externally it is finely pubescent with gland-tipped hairs, and within the mouth over the bases of the anterior lobes it is pubescent with white hairs. The five stamens, alternate with the corolla-lobes, are remarkably modified: the posterior, which is deflected to lie against the anterior lip, is sterile, forming no anther, the white flattened filament bearing on its posterior face a bristle-like beard of yellow hairs; the others, which all develop anthers, have filaments of two lengths, the antero-laterals longest, and are arched so that the anthers approximate in pairs against the posterior side of the throat; the four anthers are alike, each of two widely-divaricate oblong, violet-gray, usually pubescent sacs, each sac opening by a slit its entire length. The pistil is of two carpels, with a two-celled ovary, a slender white style, and a small capitate stigma. The pyramidal woody-walled capsule opens by splitting from the apex for a portion of its length, the primary fissure dividing the partition-wall between the cells, the secondary slighter fissure opening some-

what each cell; the lance-like central placenta, originally a part of the partition-wall, breaks down distally, so affording a free common egress for the seeds at the opened capsule-apex. The numerous seeds are polyhedrons of five or six faces, gray-brown, the outer seed-coat being conspicuously reticulate.

Because this is the best-known of all our beard-tongues, and the one that thrives most easily under cultivation, it seems the logical one with which to introduce a series of illustrations and studies of *Penstemon*. It may be found in almost any botanical garden, and beyond the suggestion to sow the seed in rich open loam, no directions need be given for its culture. Indeed, that it is capable of thriving quite without attention, the history of its introduction into the eastern United States shows. Only a little over eighty years ago the botanical explorer, Thomas Nuttall, discovered the species of the prairies of the Arkansas River, probably in what is now the state of Oklahoma—to-day it may be seen in sufficient abundance in the pasture-fields about his home-city, Philadelphia. Indeed the strong-smelling, rank-growing foxglove beard-tongue is far from popular with the farmers of that section.

However, the plant is worthy of all its popularity with lovers of beautiful flowers. The abundance of bloom, the stately dignity of each inflorescence which makes each stalk seem in itself a trophy, the delicacy of outline and purity of color of each flower—all make this a plant the first finding of which the amateur remembers. And for the scientist the study of the inflorescence, flower or fruit gives a wealth of significant detail.

Penstemon is one of the largest plant-genera in North America, and, as only one species occurs beyond this continent, the genus might almost be constituted a pan-continental floral emblem. In beauty any one of the species is worthy of such honor—the corolla-form has grace and distinction, and in color there is great variety—a few species are yellow, more are red or white, and the large majority are lavender, purple, or blue, climax-colors of the plant-world. The genus is fundamentally one of the most natural known—the unique stamen-structure especially emphasizing the genetic kinship of the whole—yet whatever type of corolla may have been primitive has evolved into a diversity so rich that its interpretation becomes one of the most fascinating problems offered by systematic botany.

FRANCIS W. PENNELL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Leaves. Fig. 3.—Flower, opened, exposing stamens. Fig. 4.—Anther, rear view, $\times 5$. Fig. 5.—Anther, front view, $\times 5$. Fig. 6.—Fruit.

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URECHITES PINETORUM

URECHITES PINETORUM**Wild Allamanda***Native of southern Florida*Family **APOCYNACEAE****DOGBANE** Family*Urechites pinetorum* Small, sp. nov.

A gray-green plant with an underground stem, the branches erect, usually simple and less than a yard tall, rarely slightly more elongate and sparingly branched and sprawling or reclining, copiously fine-pubescent. The leaves are opposite, commonly spreading, usually rather close together, one and a half to three inches long. The blades are obovate, oval, or elliptic, gradually or abruptly narrowed into short petioles, dull, copiously fine-pubescent at least when young, persistently pubescent but with the hairs sometimes scattered at maturity, becoming finely reticulate, especially beneath, more or less revolute, with the midrib closely soft-pubescent. The flowers are borne in lateral racemes, usually few together, somewhat nodding. The calyx is green, finely pubescent, with lanceolate-subulate, somewhat involute, acuminate lobes. The corolla is yellow, showy, with a tube about as long as the calyx, a campanulate throat, and a limb two and a half to three and a half inches wide. The lobes of the limb are about as wide as long, oblique and obliquely pointed. The anther-bodies are lanceolate-sagittate, nearly a half inch long, each with two curved appendages at the base and an elongate slender strap-like appendage at the apex. The filaments are stout and only about one third as long as the anther-bodies, pubescent. The style and stigma are glabrous. The follicles are paired, elongate-subulate, three and a half to seven and a half inches long, curved, finely fluted and minutely pubescent in age. The seeds are numerous, each terminated with a tuft of silky hairs longer than the body and beak. The seed-body is linear-cylindric, less than a quarter of an inch long, brown and tipped by a slender beak.

Most of the flowers of the northern species of the dogbane family are small and inconspicuous or relatively inconspicuous. However, in the tropics there are many kinds with large and showy flowers. In northern conservatories and in southern gardens the allamandas are striking plants on account of their beautiful green foliage and the showy yellow flowers. The hammocks and pinelands of tropical Florida harbor several handsome plants of the dogbane family. Those with yellow corollas are often popularly known as wild allamandas.

The best known one and that most common in southern Florida and the neighboring Bahama Islands is botanically known as *Urechites lutea*. This species was first found in the Bahama Islands in the earlier part of the eighteenth century, and it was illustrated in color by Mark Catesby in his Natural History of Carolina, Florida, and the Bahama Islands. This same plant is common in the hammocks of the Florida Keys. There it occurs as a vigorous vine, sometimes climbing to the top of tall trees where it forms a mat of tangled branches which bear rather large yellow flowers.

The wild allamanda here illustrated has a restricted geographic range. It occurs, as far as we now know, only on the Biscayne Pineland of the Everglade Keys, particularly in the vicinity of Cocoanut Grove, Florida. It is strictly an inhabitant of the pine woods, and not of the hammocks. Unlike its relative, *Urechites lutea*, it is not a climber. Its stems are erect. Sometimes, late in the season, it produces flagellate branches which recline, but it is not known to climb, even when there is shrubbery adjacent for it to lay hold of. Like a number of other plants growing in woods that have been fire-swept for ages, this plant has an underground stem which is well protected in the small erosion-holes of the limestone rock on which it grows. The forest fires may burn off the branches, but the stem is not harmed by fire.

Specimens in flower were collected near Cocoanut Grove, Florida, by Small and Wilson, May 9, 1904 (no. 1714), and may be taken as the type of this new species; characteristic fruiting specimens were collected by Small and Carter, near Kendall, Florida, November 5, 1906 (no. 2654). The plants from which the accompanying illustration was made were collected in the pine woods west of Cocoanut Grove, Florida, April 25, 1918, by the writer.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Fruit.



EUPATORIUM MACULATUM

EUPATORIUM MACULATUM**Spotted Joe-pye Weed***Native of northeastern North America*Family **CARDUACEAE****THISTLE** Family*Eupatorium maculatum* L. Cent. Pl. 1: 27. 1755.*Eupatorium purpureum maculatum* Darl. Fl. Cest. 453. 1837.

A stout erect leafy perennial two to six feet high. The stem is solid, terete, strongly purplish tinged, and more or less sulcate; it is thickly spotted with dark purple linear markings, and is glandular-pulverulent below and glandular-pubescent in the inflorescence. The leaves below the inflorescence are in whorls of three or four and there are a very considerable number of these whorls; the leaves are ovate or ovate-lanceolate, three to nine inches long and two to three inches wide; they are sharply doubly serrate, acute or acuminate at the apex and tapering at the base to the rather short petiole; they are thickish, with very prominent veins on both sides, smooth or nearly so above, and glandular and more or less pubescent beneath. The heads of flowers are very numerous in a terminal more or less elongate cyme and are on short slender pedicels. The involucre is oblong-cylindric, and about four or five lines long; the scales are imbricate in four or five rows, and strongly tinged with reddish purple; they are narrowly oblong, obtuse, thin, and slenderly few-nerved; each involucre contains some six to eight similar flowers, the upper portions of which somewhat exceed the involucre. The pappus is white, not very copious and sparingly barbed upwards under a microscope. The corollas are purplish tinged and the lobes are erect or but little spreading and are somewhat shorter than the anthers. The styles are purple, elongate and very slender. The achenes are very slender, one quarter to one third of an inch long, angular, resinous-dotted, and tapering at the base to a sharp point.

The joe-pye weeds with their very numerous purple flowers occur in great abundance in the northeastern part of North America. Around New York they furnish a very considerable share of the brighter coloring of our swamps and woods in late summer and autumn. The species here illustrated is the most conspicuous one of all, not only on account of its bright red-purple heads, but also because it grows in such wonderful luxuriance in the open swamps. It is a conspicuous plant in the vegetation of the north meadow in the New York Botanical Garden; it was from a specimen obtained

here that the illustration was prepared. It is in truth one of our most showy wild-flowers, but its attractiveness is sadly marred by the disagreeable and foetid odor given off by its numerous glands at flowering time.

As I am acquainted with it, it is a most typical member of the flora of the tussock-sedge (*Carex stricta*) swamps, and I do not remember having seen it elsewhere. The manuals give it a most extensive range, as from Newfoundland to British Columbia, and south to Kentucky and New Mexico, but this range is open to very considerable doubt.

The plant here described is the one which for many years has been passing in all our floras as *Eupatorium maculatum*, but it is to be noted that the description of Linnaeus apparently applies better to another plant.

KENNETH K. MACKENZIE.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Flower-head, $\times 2$.



HELIOTROPIUM POLYPHYLLUM

HELIOTROPIUM POLYPHYLLUM**White Heliotrope***Native of southern Florida and tropical America*Family **HELIOTROPIACEAE****HELIOTROPE** Family*Heliotropium polyphyllum* Lehm. Neue Schr. Nat. Ges. Halle 3 : 9. 1817.*Schleidenia polyphylla* Fresen. in Mart. Fl. Bras. 8¹: 36. 1857.

Plants a yard tall or less, usually erect, the stem simple below the inflorescence or branched at the base and throughout, with the branches ascending or partly decumbent, strigose, leafy, with ultimately brown or reddish thin bark exfoliating in age. The leaves are alternate, spreading or ascending, rather close together, sometimes approximate, mostly one half to one inch long. The blades are linear to narrowly elliptic, or sometimes slightly broadened upward, short-petioled, acute or short-acuminate, finely strigose, often more copiously so than the stem and branches, entire, commonly slightly revolute. The flowers, borne in scorpioid elongating racemes which terminate the stem and the branches, are crowded near the tip of the rachis. The bracts subtending the flowers are ovate, oval, or elliptic, less than half an inch long. The flower-stalks are short and stout. The calyx is pubescent like the leaves, with a turbinate to broadly campanulate tube and five lobes. The lobes are longer than the tube and various in size and shape; the two outer are ovate or ovate-lanceolate, acute, the three inner rather shorter than the outer, lanceolate, acute or short-acuminate. The corolla is mainly white, finely pubescent without; the tube is shorter than the calyx, more or less swollen at the middle; the limb is five-lobed and pentagonal in outline, usually three eighths of an inch wide, greenish at the center where the throat is partly closed by retrorse appendages with deltoid lobes, these apparently ovate by the inrolling of the margins, about as long as the body of the limb. The five stamens are included in the corolla-tube, with the filaments adnate to the corolla-tube for the greater part of their length, the free portion short but slender. The anthers are conic-lanceolate, about an eighteenth of an inch long. The gynoecium is included in the corolla-tube. The ovary is seated in a short disk and surmounted by a cylindric style. The stigma is annular and surmounted by a conic, somewhat two-lobed appendage. The fruit is a depressed globose-ovoid obscurely four-sided nut, minutely pubescent, with a cavity at the apex where the style was attached.

There are three conspicuous heliotropes in southern Florida, two of them with yellow flowers and one with white. One of the yellow-

flowered kinds is an erect shrubby plant of the Everglades (see plate 135 of this work), the other is a prostrate herbaceous plant of the rocky pinelands of the Everglade Keys. The species here illustrated is white-flowered and grows in hammocks on the eastern coast of Florida and on low prairies on the western side of the peninsula.

This plant was discovered in Brazil and was first described in 1817, figured in 1821, and first found in Florida about the middle of the last century. Thus it represents one of a number of plants common to Florida and South America whose seed may have been carried north or south by migratory birds.

The most luxuriant growth yet encountered, is in the Deering Hammock at Cutler. There it occurs as a robust plant, often a yard tall. On the prairies west of the Everglades it is usually, if not always, stunted, but quite abundant. Large areas of the prairies are often carpeted with a low growth of it.

Like its yellow-flowered relative of low situations, *Heliotropium Leavenworthii*, the flowers of this heliotrope are very faintly fragrant or inodorous, while the flowers of another relative, *Heliotropium horizontale*, of the pine-lands of the Everglade Keys, are as fragrant as those of the commonly cultivated heliotrope, *Heliotropium peruvianum*.

The specimens from which the accompanying illustration was made were collected by the writer in the Deering Hammock, Cutler, Florida, May 13, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Root. Fig. 3.—Calyx, $\times 3$.



MALUS HALLIANA

MALUS HALLIANA**Hall's Apple***Native of western China*

Family MALACEAE

APPLE Family

Malus Halliana Koehne, Gatt. Pom. 27. 1890.*Pyrus Halliana* Voss, Vilmorin's Blumengärtn. ed. 3. 1: 277. 1896.

A shrub or small tree up to fifteen feet high, with a loose open crown, the bark of the branches reddish brown. The glabrous leaves, which are convolute in the bud, are leathery; the petioles, glabrous at maturity, are commonly a half inch long or less. The blades are elliptic-oblong, those on the new shoots often ovate or ovate-lanceolate, up to two and a half inches long and an inch wide, the apex as well as the base acute, or the base rounded in those of the new shoots; the upper surface is rather dark green and glabrous, except the hairy and glandular midrib, the lower surface much paler, glabrous; the margins are crenate-serrate. The rose-colored flowers, in umbels of two to six, are on slender drooping red or purple pedicels one to two inches long. The calyx, of the same color as the pedicel, has the lobes ovate, about half as long as the tube, and either acute or obtuse at the apex. The petals are oval, rounded at the apex, and of a rose color. The stamens are about twenty. The styles are four or five, united almost to the middle. The fruit is about the size of a pea, is abruptly contracted into a thickened pedicel, and is of a brownish red; the seeds are about a sixth of an inch long.

Among our decorative shrubs and trees this is one of the most charming, sending forth an abundance of beautiful rose-colored flowers usually late in May in the vicinity of New York. It is of well-rounded habit, with spreading branches which are not too closely crowded, thus giving an airiness and lightness to the tree not possessed by all apples. A native of China, it has long been cultivated in Japanese gardens. About 1863 it was introduced into American gardens by Dr. G. R. Hall, an American physician, who made his home in China and Japan for many years. It is hardy as far north as Massachusetts. The illustration was prepared from a specimen of this plant which has been in the collections of the New York Botanical Garden since 1896.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Fruiting branch.



HELIOTROPIUM LEAVENWORTHII

HELIOTROPIUM LEAVENWORTHII**Yellow Heliotrope***Native of southern Florida*Family **HELIOTROPIACEAE****HELIOTROPE** Family

Heliotropium polyphyllum Leavenworthii A. Gray, Proc. Am. Acad. 10: 49. 1874.
Heliotropium Leavenworthii Torr.; Small, Fl. SE. U. S. 1006. 1903.

Plants fully a yard tall or less, simple, or sparingly branched and erect and sometimes strict, or widely branched at the base with the branches spreading and decumbent, copiously strigose with white or whitish hairs. The bark of the woody stems is ultimately brown, exfoliating or sometimes in wet places persistent and cross-checked. The leaves are alternate, deciduous from the main stem and the branches, rather close together or even crowded on the branchlets, one inch long or less. The blades are spatulate at the base of the stem to linear or linear-lanceolate higher up and on the branches, rather closely short-strigose with white or whitish hairs, acute or short-acuminate at the apex, flat or sometimes slightly revolute, short-petioled. The flowers are borne in scorpioid racemes, which terminate the stem and the branches and are quite compact near the tip of the rachis. The bracts are lanceolate, ovate-lanceolate, or elliptic, acute or slightly acuminate, relatively shorter and broader than the leaves, and pubescent like them. The flower-stalks are short and stout. The calyx is closely strigose, with a short turbinate tube and five lobes. The lobes are unequal and much longer than the tube; the two outer are elliptic-lanceolate and acute, the three inner lanceolate or linear-lanceolate and short-acuminate. The corolla is golden-yellow, rather closely strigose without; the tube is about as long as the calyx, slightly swollen at the middle; the limb is five-lobed, fully a quarter of an inch in diameter, often slightly darker at the center where the throat is mainly closed by retrorse appendages with ovate obtuse lobes which are about as long as the rest of the limb. The five stamens are included in the corolla-tube, to which the filaments are adnate for over one half their length, the free portion very slender and slightly shorter than the anther. The anthers are conic-lanceolate, about one twentieth of an inch long, acuminate. The gynoecium is included in the corolla-tube. The ovary is broadly ovoid, seated in an obscure annular disk, surmounted by a slender cylindric style. The stigma is annular and surmounted by a conic appendage. The fruit is a globose-ovoid obscurely four-sided nut, often minutely pubescent, commonly abruptly pointed at the apex, the nutlets tardily separating, obliquely ovoid.

Our native heliotropes are nowhere as conspicuous as in southern Florida. The margins of the Everglades and the adjacent prairies, as well as the flatwoods northward, commonly support large areas covered with a growth of heliotropes.

This species is the heliotrope of the Everglades and the connecting prairies and adjacent low pinelands. It also, apparently, occurs at outlying localities. The original specimens were collected by Dr. M. C. Leavenworth, evidently during the Seminole wars, and are recorded as coming from Tampa Bay. We have specimens collected during the same period nearer the natural center of this plant's geographic distribution. The label reads "Found in Alpatiokee Swamp (pine woods) near Fort Vinton, Fla." A note accompanying the label in Dr. Torrey's handwriting says, "Sent to me by U. S. A. officer whose name I have unfortunately lost. J. T." This swamp, now called Halpatiokee, was recently traversed by the writer, who can testify that the plant still grows there in great abundance.

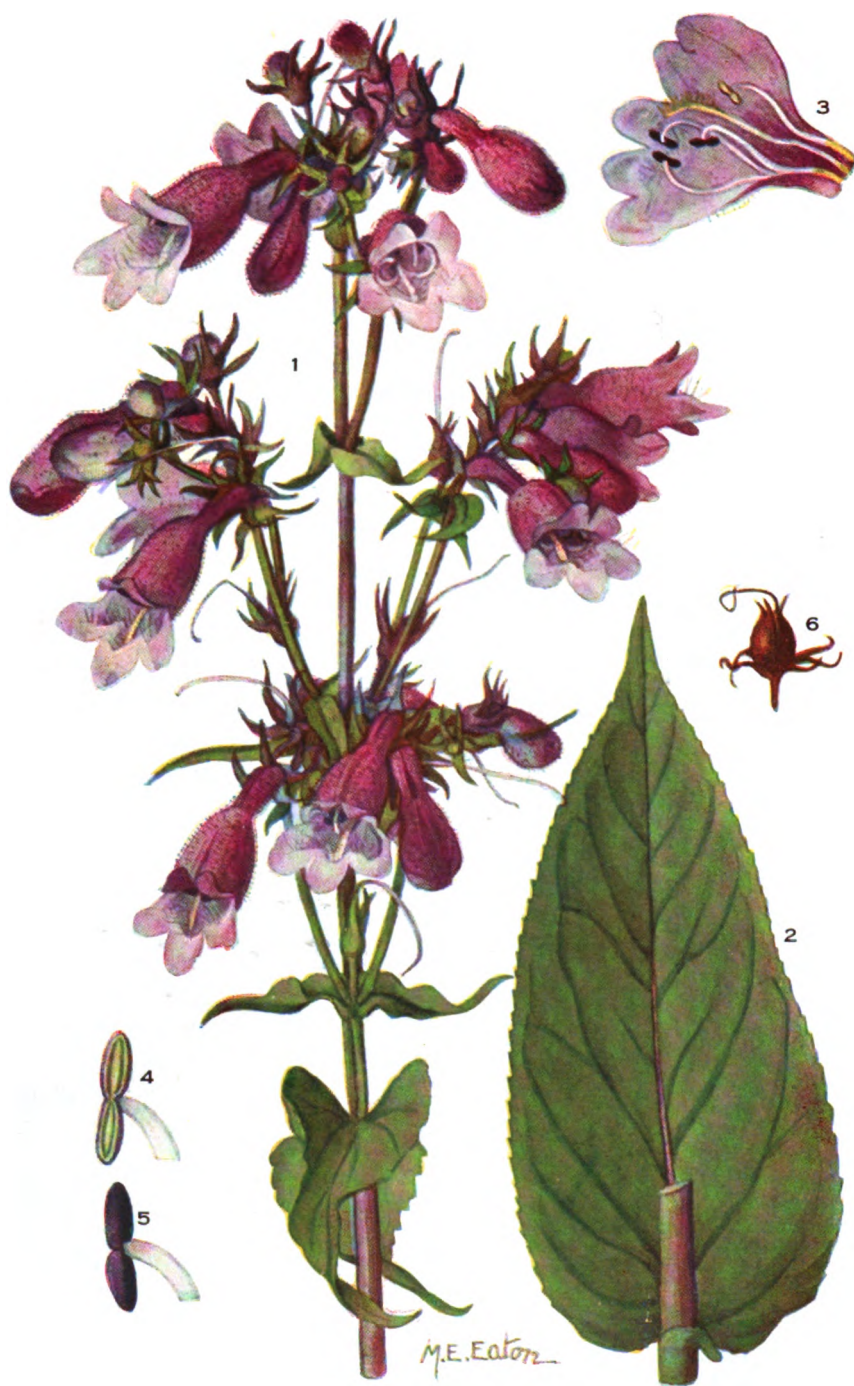
On the edges of the everglades and in the adjacent low pinelands this plant often grows very abundantly, forming carpets of yellow as far as the eye can see.

After the early collections cited above the plant was collected only a few times in the latter half of the last century. It was only after the botanical exploration of Florida was taken up by the Garden and the writer that its geographic range became evident.

The specimens from which the accompanying illustration was made were collected by the writer May 20, 1918, from plants transplanted from the Everglades, and grown in the reservation of Mr. Charles Deering at Buena Vista, Florida.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Root. Fig. 3.—Calyx. Fig. 4.—Nutlet, $\times 3$.



PENSTEMON CALYCOSUS

PENSTEMON CALYCOSUS**Long-sepaled Beard-tongue***Native of the southeastern Mississippi Valley*

Family SCROPHULARIACEAE

FIGWORT Family

Penstemon calycosus Small, Bull. Torrey Club 25: 470. 1898.

A nearly glabrous herbaceous plant, from a short much branched rootstock sending up several erect or glabrous stems, two to four feet tall, each terminating in a panicle of violet-purple flowers. The leaves are of two types: those of the winter rosette, in summer persisting at the base of the stem, are prevalingly ovate and petioled; those of the stem itself are slightly narrower and sessile, all but the lowermost clasping by a rounded base; all are glabrous or nearly so, green, slightly paler beneath, with irregularly serrate margins. The panicle, less than one third the height of the plant, is rounded-pyramidal, its primary bracts broad and leaf-like; the branching is as in *P. Digitalis*; its stems, pedicels, and calyces are covered with gland-tipped hairs. The flowers are on pedicels of varying length, but never of more than a half inch. The sepals are linear, nearly one half inch long. The corolla is nearly one and a half inches long, its form nearly as in *P. Digitalis*, but the throat more gradually inflated, and the lobes less spreading; the corolla externally is violet-purple, within it is paler, and with a few faint darker violet lines on the anterior side; externally it is finely pubescent with gland-tipped hairs, and within, over the bases of the anterior lobes, it is strongly pubescent with white hairs. The stamens are essentially as in *P. Digitalis*, the anthers being always glabrous. The pistil, capsules, and seeds are nearly as in that species.

Not only is this one of the largest-flowered of our eastern beard-tongues, but in color it is also one of the most beautiful. The flowers tend to cluster in horizontal tiers. The outer surface of each corolla is a delicate purple-red; often on the lobes of the inner surface this coloring is deepened to violet while the throat within is always pale. The long white hairs just at the mouth show against the shadowed interior. The golden-yellow beard of the sterile filament lies like a tongue against the anterior lip, and arched closely against the posterior side are the violet-grey fertile anthers. A combination of colors, to which our illustration can do but incomplete justice!

The plant grows naturally on shaded calcareous soils. I have seen it in profusion on limestone ledges in ravines on the forested slopes of Monte Sano, north of the Tennessee River, in northern Alabama. From there it occurs northward through central Tennessee and Kentucky, and has even been found as far as Lafayette, Indiana. It should be looked for through this and adjoining areas.

Penstemon calycosus was first described from specimens collected by Eugene P. Bicknell at Nashville, Tennessee. He found it plentiful on the bluffs of the Cumberland River. The history of the plant we now illustrate is this: On May 28, 1917, I sent from Monte Sano, Alabama, by mail, a single plant in blossom. It arrived too wilted for painting, but was placed in our herbaceous grounds. On my return to the Garden in April of last year, after there had been experienced here a winter of record-breaking prolonged cold, imagine my surprise to find that this root from "the South" had increased to a considerable clump, and gave promise of abundant bloom. This was realized and both flower and fruit obtained. This history is convincing evidence of the ease of culture of the long-sepaled beard-tongue.

FRANCIS W. PENNELL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Leaf. Fig. 3.—Flower opened, exposing stamens. Fig. 4.—Anther, front view, $\times 5$.



RHABDADENIA CORALLICOLA

RHABDADENIA CORALLICOLA**Little Allamanda***Native of southern Florida*

Family APOCYNACEAE

DOGBANE Family

Rhabdadenia corallicola Small, Bull. N. Y. Bot. Gard. 3: 434. 1905.

An erect or diffuse shrub with a thick tough root and a woody caudex. The stems are solitary or several together, up to four feet tall, or rarely more elongate, and with the branches rarely slightly twining at the tips, the twigs pubescent with fine brownish hairs. The glabrous leaves are opposite, rather close together, and commonly erect or ascending. The blades are elliptic or elliptic-lanceolate, more or less revolute, obtuse but apparently acute on account of the revolute margins, dark green and shining above, paler, dull, and obscurely veined beneath, rounded or subcordate at the base, short-petioled, the petioles leaving prominent scars on the stem when the leaves fall. The racemes are lateral, few-flowered, with small ovate to lanceolate bracts subtending the pedicels, which vary from one half to three quarters of an inch in length at maturity. The calyx is fleshy, glabrous; the five lobes are deltoid-ovate or ovate-acuminate, fully one twelfth of an inch long, persistent and with spreading tips at maturity. The corolla is bright yellow, commonly nodding, with a short-cylindric tube, a longer campanulate throat, and a spreading five-lobed limb fully one inch wide; the lobes are about as wide as long, inequilateral and obliquely pointed. The five stamens are borne on the lower part of the corolla; the filaments are adnate to the corolla-tube except a short free part of each which is pubescent with long hairs. The anthers are lanceolate-sagittate, about one sixth of an inch long, each with two deflexed basal curved or hooked spur-like auricles which are slightly shorter than the free part of the filament. The gynoecium consists of two ovoid glabrous carpels seated in a five-lobed disk, a filiform style, and an enlarged stigma which is dilated into a reflexed membrane at the base. The follicles are paired, three to five inches long, subulate, glabrous, bright green at maturity, but brown after dehiscence. The seeds are numerous; the body is narrowly fusiform, about one fourth of an inch long, narrowed into a short neck or beak which is dissolved into numerous hairs.

The plant here illustrated, although not particularly large-flowered, is one of the conspicuous elements in the vegetation of the pine woods south of Miami, Florida. Yellow and white predominate in the corollas of the dogbanes of southern Florida, but

yellow quite eclipses white and other colors. As in our other southern dogbanes the clear yellow of the corollas is in striking contrast with the dark green or deep green foliage.

This little allamanda grows very abundantly throughout the pinelands of the Everglade Keys and in the adjacent Everglades. It blooms throughout the year, but more copiously during the spring and summer.

Considering the abundance of this plant within its geographic range on the Florida mainland it seems strange that specimens were not collected there many years ago. The earliest specimens we have seen were collected on Pine Key* of the Florida reef, evidently before the middle of the last century, by J. L. Blodgett. During the forties of the nineteenth century Blodgett, who resided on Key West, made collections of the plants of the lower Florida Keys. These represent the first relatively complete collection of the flora of those islands and the only one that amounted to much until the writer and his associates took up the exploration of the Florida Keys a few years ago. In 1903, after a lapse of fully fifty years, this plant was discovered on the Florida mainland by the writer, and he subsequently rediscovered it on Big Pine Key.

The specimen from which the accompanying illustration was made was collected by the writer in pinewoods on the reservation of Charles Deering at Cutler, Florida, May, 1918.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Base of stem. Fig. 3.—Fruit.

* Both Big Pine Key and Little Pine Key were involved in the early collections from the Florida reef. However, Pine Key was usually used to designate Big Pine Key.



CRATAEGUS MACROSPERMA

CRATAEGUS MACROSPERMA**Variable Thorn**

Native of the northeastern United States and Nova Scotia

Family MALACEAE

APPLE Family

Crataegus macrosperma Ashe, Jour. Elisha Mitchell Soc. 16: 74. 1900.

A shrub or small tree, sometimes up to twenty-five feet tall, the ascending branches with numerous curved spines up to three inches long. The leaves have slender petioles up to an inch long; the blades are membranous, dark yellow-green above, slightly villous, becoming glabrous, elliptic-ovate to broadly ovate, up to three inches long and as wide, the base rounded or truncate, or rarely cordate, the apex acute, with the margins singly or doubly serrate. The corymbs are glabrous or sparingly villous, the flowers from a half to five sixths of an inch broad. The sepals are usually entire and the petals orbicular. The stamens are commonly from five to ten, sometimes twenty. The styles are usually three. The ellipsoid or pyriform fruit varies from scarlet to crimson, and is often glaucous, and is from a half to three quarters of an inch thick; the flesh is soft at maturity and the persistent calyx-lobes erect or spreading; the nutlets are three or four.

An exceedingly variable species, over fifty names having been given to varieties of little distinction. It is found widely distributed from Nova Scotia and Maine to southeastern Minnesota, North Carolina, and Tennessee. The flowers appear in May, and its fruit is ripe in August or September. The specimen from which the illustration was prepared has been in the collections of the New York Botanical Garden since 1903.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Fruiting branch.



OXYDENDRUM ARBOREUM

OXYDENDRUM ARBOREUM

Sourwood

Native of the southeastern United States

Family ERICACEAE

HEATH Family

Andromeda arborea L. Sp. Pl. 394. 1753.*Oxydendrum arboreum* DC. Prodr. 7: 601. 1839.

A tree attaining a height of fifty to sixty feet. The thick reddish grey bark is furrowed; the smooth young twigs are light green, becoming orange-brown. The leaves, which turn scarlet in the fall, are shining, and have stalks less than an inch long. The blades are oblong to oval-lanceolate, up to six inches long, and are smooth and bright green; they are rather long-pointed at the apex, narrowed at the base, and have the margins sharply and finely toothed. The white flowers, on short stalks, are nodding and are arranged in one-sided racemes which are in panicles at the ends of the branches; the persistent sepals are short; the ovoid-cylindric corolla is about a half inch long and is five-toothed at the apex. The stamens are ten, about as long as the corolla, with the filaments wider than the anthers, which open by long slits. The ovary is five-celled. The five-angled fruits, which are woody and ovoid-pyramidal, are a sixth to a quarter of an inch long and are on curved stalks; when mature they split into five valves.

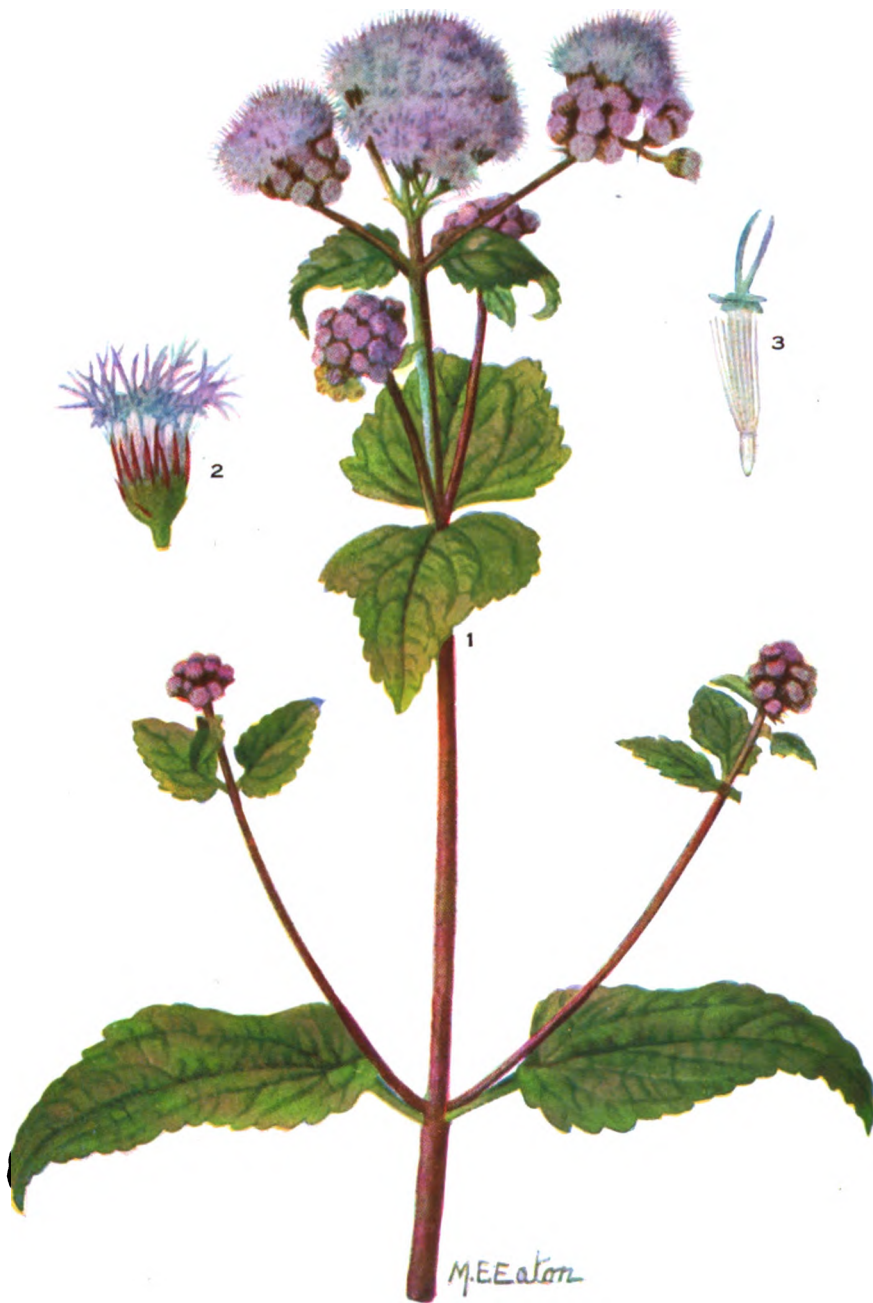
This tree grows wild from southern Pennsylvania and Maryland to Florida, Tennessee, and Louisiana. It is known locally as sour gum, arrow-wood, titi, sorrel-tree, and lily-of-the-valley tree. It occurs in woodlands on ridges rising above the banks of rivers, preferring a well-drained gravelly soil. On the western slopes of the Big Smoky mountains in Tennessee it is said to attain its greatest size. The trunk is straight, rarely exceeding a foot in diameter, the slender spreading branches forming a narrowly oblong round-topped head. The leaves when they first unfold are a shining bronzy green, later becoming bright green, and turn to scarlet in the fall. It is hardy as far north as Massachusetts. It flowers in the vicinity of New York late in July or early in August, at a time when few trees or shrubs are in blossom, thus being of decorative value not only on account of its attractive flowers, but also on account of their timely appearance. It was cultivated in England by Philip Miller as early as 1752. It has been in cultivation in the New York Botanical Garden since 1895; the specimen

from which the illustration was prepared was added to the collections of that institution in 1916.

It is readily propagated from seeds, but the seedlings are of slow growth, taking many years to produce a goodly sized tree. The sourwood is of little economic importance; the leaves, which have a pleasantly acidulous taste, are said to allay thirst when chewed; they are also said to be tonic. The genus contains but the one species.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Portion of inflorescence. Fig. 2.—Flower, corolla removed, $\times 5$. Fig. 3.—Stamen, $\times 7$. Fig. 4.—Fruiting branch.



EUPATORIUM COELESTINUM

EUPATORIUM COELESTINUM**Mist-flower***Native of eastern United States and Cuba*Family **CARDUACEAE****THISTLE** Family*Eupatorium coelestinum* L. Sp. Pl. 838. 1753.*Conoclinium coelestinum* DC. Prodr. 5: 135. 1836.

A perennial branching herb, one to three feet high. The stems are more or less pubescent, red to brown-tinged, and bear opposite, petioled leaves. The leaf-blades are truncate or narrowed into the petiole at the base, acute at the apex, crenate-dentate on the margin, and about half as long as wide. The flowers are in compact cymes, few in each head. The broadly campanulate involucre have linear-lanceolate, acuminate bracts in one or two series, green at the bases and brownish at the tips. The corollas are regular, with slender tubes and five-lobed limbs, the lobes being intensely colored ageratum-blue. The anthers are inconspicuous, but the branches of the style are elongate, brightly colored, and give a misty appearance to the inflorescence. The achenes are five-sided, and bear several capillary bristles. The receptacles are distinctly conic.

This American plant was found in the early days of this country's botanical history in the mountains of Virginia by Pursh, in the Carolinas by Fraser, and on the banks of the Ohio River by Rafinesque. Its introduction to cultivation seems not to be recorded. Differing from other species of *Eupatorium* in having a conic receptacle, it has been placed in a separate genus, *Conoclinium*, but is retained as a *Eupatorium* by most authors. It resembles the ageratum of our gardens, and is often referred to as the perennial ageratum.

The place of the mist-flower in horticulture is in the hardy border, where its delicate light-blue flowers blend well with others of its season. Blooming in August, it comes in time to be used with our phloxes and other hardy native plants, which are lacking in blue colors, and can also possibly be grown to advantage in shady places with its relative the white snakeroot, *Eupatorium urticaefolium*. Propagation is effected by division of the roots in fall or spring, and by seeds.

Our illustration was made from plants growing in the flower borders of the New York Botanical Garden since 1905.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Head of flowers, $\times 2$. Fig. 3.—Flower, $\times 4$.

FORMER PLATES

- PLATE 11. CRINUM AMERICANUM
 PLATE 12. CLETHRA ALNIFOLIA
 PLATE 13. ECHEVERIA CARNICOLOR
 PLATE 14. MINA LOBATA
 PLATE 15. CLERODENDRON TRICHOTOMUM
 PLATE 16. NOTYLIA SAGITTIFERA
 PLATE 17. EXOGONIUM MICRODACTYLUM
 PLATE 18. VITEX AGNUS-CASTUS
 PLATE 19. OPUNTIA MACRORHIZA
 PLATE 20. COMMELINA COMMUNIS
 PLATE 21. ADOXA MOSCHATPELLINA
 PLATE 22. SISYRINCHIUM BERMUDIANA
 PLATE 23. COLUMNEA HIRTA
 PLATE 24. PEDILANTHUS SMALLII
 PLATE 25. CREMOPHILA NUTANS
 PLATE 26. PITHECOLOBIUM GUADALUPENSE
 PLATE 27. ANTHURIUM GRANDIFOLIUM
 PLATE 28. EPIDENDRUM PALEACEUM
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 PLATE 30. ONCIDIUM UROPHYLLUM
 PLATE 31A. SEDUM DIVERSIFOLIUM
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 PLATE 32. CATASETUM SCURRA
 PLATE 33. CHIONODOXA LUCILIAE GIGANTEA
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 PLATE 42. TRICHOSTERIGMA BENEDICTUM
 PLATE 43. BENTHAMIA JAPONICA
 PLATE 44. DIRCAEA MAGNIFICA
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 PLATE 47. WERCKLEOCEREUS GLABER
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 PLATE 49. ABELIA GRANDIFLORA
 PLATE 50. PEPEROMIA OBTUSIFOLIA
 PLATE 51. SOLIDAGO JUNCEA
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ADDISONIA

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AND
POPULAR DESCRIPTIONS
OF
PLANTS

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NUMBER 3

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"the income and accumulations from which shall be applied to the founding and publication, as soon as practicable, and to the maintenance (aided by subscriptions therefor), of a high-class magazine bearing my name, devoted exclusively to the illustration by colored plates of the plants of the United States and its territorial possessions, and of other plants flowering in said Garden or its conservatories; with suitable descriptions in popular language, and any desirable notes and synonymy, and a brief statement of the known properties and uses of the plants illustrated."

The preparation and publication of the work have been referred to Dr. John H. Barnhart, Bibliographer, and Mr. George V. Nash, Head Gardener.

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PAPHIOPEDILUM ROTHSCILDIANUM

PAPHIOPEDILUM ROTHSCILDIANUM

Rothschild's Venus-slipper

Native of Borneo, Sumatra, and New Guinea

Family ORCHIDACEAE

ORCHID Family

Cypripedium Rothschildianum Reichb. f. Gard. Chron. 63: 457. 1888.*Paphiopedilum Rothschildianum* Pfitz. Bot. Jahrb. 19: 41. 1894.

A plant with long basal leaves and striking yellow flowers marked with purple. The leaves are at the base of the plant, strap-shaped and obtuse, and are up to two feet long and two inches wide, glabrous throughout. The scape sometimes reaches a height of over two feet, thus somewhat exceeding the leaves, and is of a violet color and minutely pubescent; it bears from one to three flowers, the diameter of which is sometimes over five inches between the ends of the sepals. The bracts are oblong-ligulate with a three-toothed apex which reaches to about the middle of the distinctly stalked ovary, and are of a green color lined with black-purple. The dorsal sepal is ovate, acute, and has the margin and back ciliolate; it is yellow with about fifteen black-purple lines. The lower sepal, made up of the two lateral sepals united, is similar to the dorsal, but is narrower and has fewer nerves. The linear seven-nerved petals are twice as long as the sepals or more, pendulous, are attenuate into a rather obtuse apex, and are up to five inches long; they are pale green with dark purple spots, and are undulate on the margins where they are ciliate with long dark hairs. The lip, somewhat laterally compressed, is about as long as the lower sepal, with the sac or pouch about equaling the claw; it is a dull purple, except the apex of the pouch which is yellow. The staminodium is of peculiar structure, resembling the head and beak of a bird; it consists of a hairy base, with a long two-toothed beak at right angles thereto, hairy on the lower surface. The stigma is nearly orbicular.

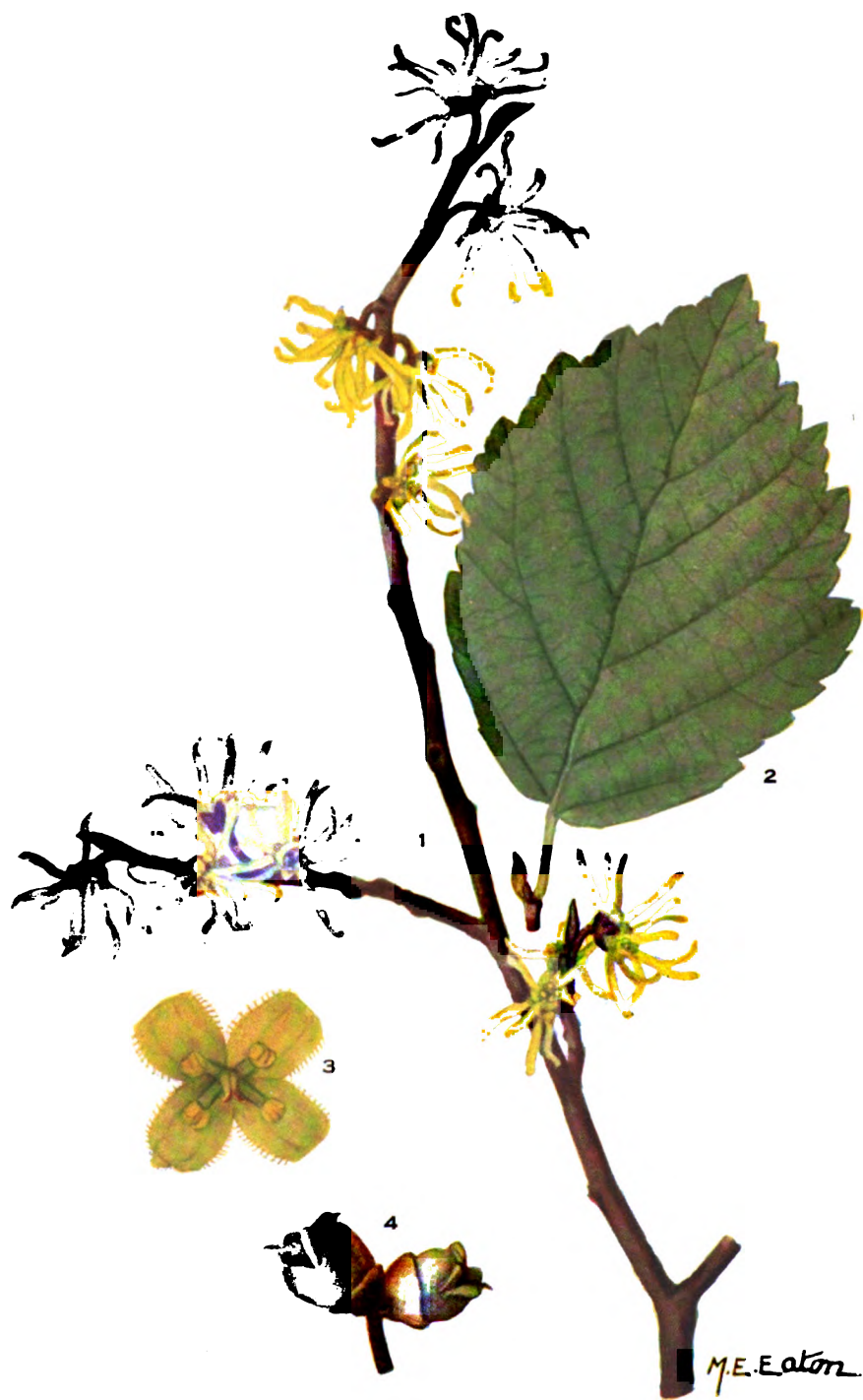
This striking plant when in flower would command attention in any collection of orchids, and its peculiarities must be seen to be appreciated. It is an inhabitant of humid hot forests, and this will give a clue to its successful cultivation. At the place where first described the assertion is made that its introduction is due to the "indefatigable zeal of Mr. F. Sander." In an advertisement in a succeeding number of the Gardeners' Chronicle it is asserted that the plant was first introduced into cultivation from New Guinea by J. Linden in May, 1887, and that the first flowers appeared in January, 1888. It was named in honor of Baron Ferdinand de

Rothschild. The plant here figured has been in the collections of the New York Botanical Garden since 1907, forming part of the large collection of orchids presented at that time by Mr. Oakes Ames.

For many years the genus *Cypripedium* was made to include a number of diverse groups, differing markedly in structure and in geographic distribution. At the present day, however, these groups are recognized by botanists as of generic value. The genus *Cypripedium*, as now understood, includes about thirty species, inhabiting the north temperate zone; about a dozen of these are found in North America. The greater part of the species of greenhouse culture, formerly considered as belonging to *Cypripedium*, now belong to *Paphiopedilum* or *Phragmipedium*; the former contains fifty species or more from the tropical regions of Asia, extending from the Indian peninsula and the Himalayan mountains to southern China, and in the Malay Archipelago from Sumatra and the Philippine Islands to New Guinea; the latter includes about a dozen species from tropical America, exclusive of the West Indies. *Selenipedium*, the remaining genus of this relationship, has but three species, exceedingly rare in cultivation, inhabiting the region from Panama to northern Brazil.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Leaves. Fig. 3.—Column, front view. Fig. 4.—Column, side view, showing staminodium arising from its base. Fig. 5.—Staminodium, upper part, seen from above.



HAMAMELIS VIRGINIANA

HAMAMELIS VIRGINIANA**Witch-hazel***Native of eastern North America*

Family HAMAMELIDACEÆ

WITCH-HAZEL Family

Hamamelis virginiana L. Sp. Pl. 124. 1753.

A large shrub, commonly under fifteen feet high, or more rarely a small tree up to thirty feet tall. The stems are usually ascending, forming a plant of rather open habit. The slender twigs are at first covered with brown hairs, but later become quite glabrous. The hairy winter-buds are light brown, slightly curved, and sharp-pointed. The leaves are alternate and have stalks usually less than a half inch long. The blades are dark green above and glabrous, the veins on the lower surface pubescent; they are ovate to almost orbicular, acute or sometimes rounded at the apex, and the base inequilateral, with one side rounded or somewhat cordate, the other wedge-shaped, the margin, except at the base, being bluntly and coarsely toothed; they are from two and a half to six inches long. The flowers are in clusters of three in the axils of the leaves on short peduncles, appearing during or after the fall of the leaves. The calyx is four-parted, the lobes reflexed; the four petals are bright yellow, strap-shaped, crisped, a half inch to an inch long; there are four short fertile stamens which are opposite to the calyx-lobes and alternate with an equal number of rudimentary stamens; the ovary is two-celled and has a short style. The ovoid hairy fruit is thick and woody, commonly a little over a half inch long, and is two-beaked; it splits open at the top, the seeds being ejected with considerable force. The smooth seeds are nearly black, shining, and are about a third of an inch long.

The great charm of this plant is in its flowers, which appear as the fall is waning and winter is near. Usually as the leaves begin to fall the bright yellow flowers arrive, making it a most attractive member among our fall-flowering shrubs, which are all too few. As defoliation advances the flowers are more evident, the shrub thus becoming a more and more conspicuous object in our late autumn landscape. The specimen from which the illustration was prepared has been in the fruticetum collection of the New York Botanical Garden since 1895.

The witch-hazel thrives in most situations, being of easy culture, but prefers a moist light soil. It may be readily propagated from seeds, which, however, do not germinate until the second year after sowing; it may also be propagated by layers. An aqueous distillation of the fresh leaves and twigs of this plant forms the extract of witch-hazel.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Leaf. Fig. 3.—Flower, $\times 4$. Fig. 4.—Fruit.



ARCTOTIS GRANDIS

ARCTOTIS GRANDIS**Arctotis***Native of South Africa*Family **CARDUACEAE****THISTLE** Family*Arctotis grandis* Thunb. Fl. Cap. 706. 1823.*Arctotis stoechadifolia grandis* Less. Syn. Gen. Comp. 26. 1832.

An annual in cultivation, growing from one to three feet high. The stems are gray-green, round, twisted, ridged, smooth at base, becoming white-woolly to ciliate toward the top. The leaves are numerous, partly clasping the stem, the young ones with white tomentum, the older ones somewhat tomentose above, conspicuously so beneath, mostly three-veined, oblong in general shape, one to six inches long, mostly lyrate and lobed, and slightly toothed, with three shallow lobes at the apex and two blunt opposite lobes near the center. The flower-heads are on six- to twelve-inch peduncles from the axils of the upper leaves, compact, rounded, red and green in bud; the involucre is cup-shaped, of three outer rows of oblanceolate, acuminate, green bracts with scarious margins, and another row of larger, scarious, transparent bracts. There are about twenty-five pistillate ray-flowers, with lavender-white ligules one inch long, which are yellow-blotched at the base; the stigmas are two-parted, purple. The disk-flowers are numerous, azure-steel-blue, perfect, tubular, the lobes reflexed. The pappus is of a small outer series, and an inner spirally twisted series of bristles.

The arctotis is one of the South African plants which are grown in our gardens as annual, summer-flowering plants, and are noted for their unusual colors. Among these are *Dimorphotheca aurantiaca*, with peculiar chrome-orange flowers, brown on the back of the ligules of the ray-flowers; *Gerbera Jamesoni*, with bright orange and red shades; *Venidium calendulaceum*, probably an *Arctotis*, with other distinct yellow shades; all of these colors uncommon in our European and American plants.

This annual has been cultivated under the name *Arctotis grandis*. Thunberg described it as a distinct species, and some later authors have called it merely a variety of *A. stoechadifolia*. There seem to have been several forms of the species, and perhaps that with long-peduncled attractive flowers was brought to Europe for cultivation, and the species described from it.

Although of a somewhat shrubby character in its native haunts, in cultivation it is treated as an annual and does not become woody. Flowering in August and September, and of free-blooming habit, this plant is a useful addition to our late summer flowers. The stems are weak, but the many long peduncles raise the blooms up in such numbers as to offset this. The center of the flower-heads is of a pale violet-blue; the rays are white above, and lavender or purple beneath; and the dusty foliage adds to the attractiveness. Propagation is by seeds sown in early spring in greenhouse or cold-frame, and planted out later.

The illustration of the arctotis was made from plants blooming in the borders of the New York Botanical Garden, where they are grown each year from collected seed.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Leaf. Fig. 3.—Ray-flower, $\times 2$. Fig. 4.—Disk-flower, $\times 4$.



CRATAEGUS SPATHULATA

CRATAEGUS SPATHULATA**Small-fruited Haw***Native of the southeastern United States*

Family MALACEAE

APPLE Family

Crataegus spathulata Michx. Fl. Bor. Am. 1: 288. 1803.

A shrub with spreading branches, or more rarely a small tree up to twenty-five feet tall, the slender branches upright. The zigzag branchlets are slender, at first a light reddish brown, later darker, and are armed with stout straight spines up to an inch and a half long, or sometimes unarmed. The dark green leaves are glabrous, shining above, paler beneath, those on the fertile branchlets fascicled and nearly sessile, while those on the sterile branchlets and vigorous shoots are scattered, have manifest petioles, and are sometimes deeply three-lobed above the middle, the lobes rounded and crenate-serrate. The blades of the fertile branchlets are oblanceolate or spatulate, crenate-serrate above the middle, rounded or acute at the apex, and are up to an inch long and a half inch broad; those on the vigorous shoots are oval or ovate. The white flowers, which are about a half inch across, are in many-flowered cymes, on glabrous pedicels which are long and slender. The hollow receptacle, or hypanthium, is broadly obconic and bears on its rim the short persistent sepals, which are entire or nearly so, and the undulate orbicular petals. The styles are two to five. The fruit is of a bright shining scarlet and about an eighth of an inch in diameter.

This interesting thorn is distributed throughout the coast region from southern Virginia to northern Florida and westward to Arkansas and Texas. It is a frequent inhabitant of rich soil along or near the banks of streams, or in swamps, and is said to attain in western Louisiana and eastern Texas its greatest size. The flowers appear late in May or early in June in the vicinity of New York city, the fruit ripening in October in the same vicinity. The specimen from which our illustration was prepared has been in the fruticetum collection of the New York Botanical Garden since 1900.

This species was discovered in South Carolina by Michaux, the great French botanist, in the latter part of the eighteenth century. Its introduction into English and French gardens occurred in the early part of the following century.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Fruiting branch.



PENSTEMON HIRSUTUS

PENSTEMON HIRSUTUS**Hairy-stemmed Beard-tongue***Native of the northeastern United States*

Family SCROPHULARIACEAE

FIGWORT Family

Chelone hirsuta L. Sp. Pl. 611. 1753.*Penstemon hirsutus* Willd. Sp. Pl. 3: 227. 1800.

An herbaceous plant, from a short branched rootstock sending up several slender stems, each terminating in a panicle of many white-tipped lavender flowers. The stems are erect, one to two feet tall, and, at least below, bear slender whitish hairs. The leaves are of two types: those of the winter rosette, in early summer persisting at the base of the stem, are ovate and petioled; those of the stem are lanceolate, and sessile, rounded at the clasping base and tapering at the apex, with usually a few slender hairs beneath toward the base, and slightly toothed on the wavy margin. The panicle, less than one third the height of the plant, is narrowly pyramidal, the primary bracts very narrow; the branching is as in *P. Digitalis*; its stems, pedicels, and calyces are covered with gland-tipped hairs; the pedicels are less than a fourth of an inch in length. The sepals are ovate, about three sixteenths of an inch long. The corolla is about one inch long, much narrower than in *P. Digitalis*, the throat being gradually and but slightly inflated while its mouth is nearly closed by two prominently raised ridges at the base of the anterior lip. The lobes of the corolla all project forward; the two posterior are arched and united for over half their length, the distinct portions spreading abruptly; the three anterior lobes are somewhat longer, and united most of their length so as to form a short platform on which a visiting bee may alight. The corolla is externally of a clear lavender, within paler, and white on the projecting anterior lip; externally it is finely pubescent with gland-tipped hairs, and within over the bases of the anterior lobes and on the ridges it is pubescent with whitish hairs. The anthers are always glabrous. The sterile filament is of the length of the anterior lip and is densely bearded with stiff yellow hairs. The capsule is slightly narrower than in *P. Digitalis*, and the seeds smaller and less sharply angled.

One of the most delicate-flowered of all the beard-tongues. The corollas are borne with a scattered profusion that shows to good advantage the form of each. Individually they are very

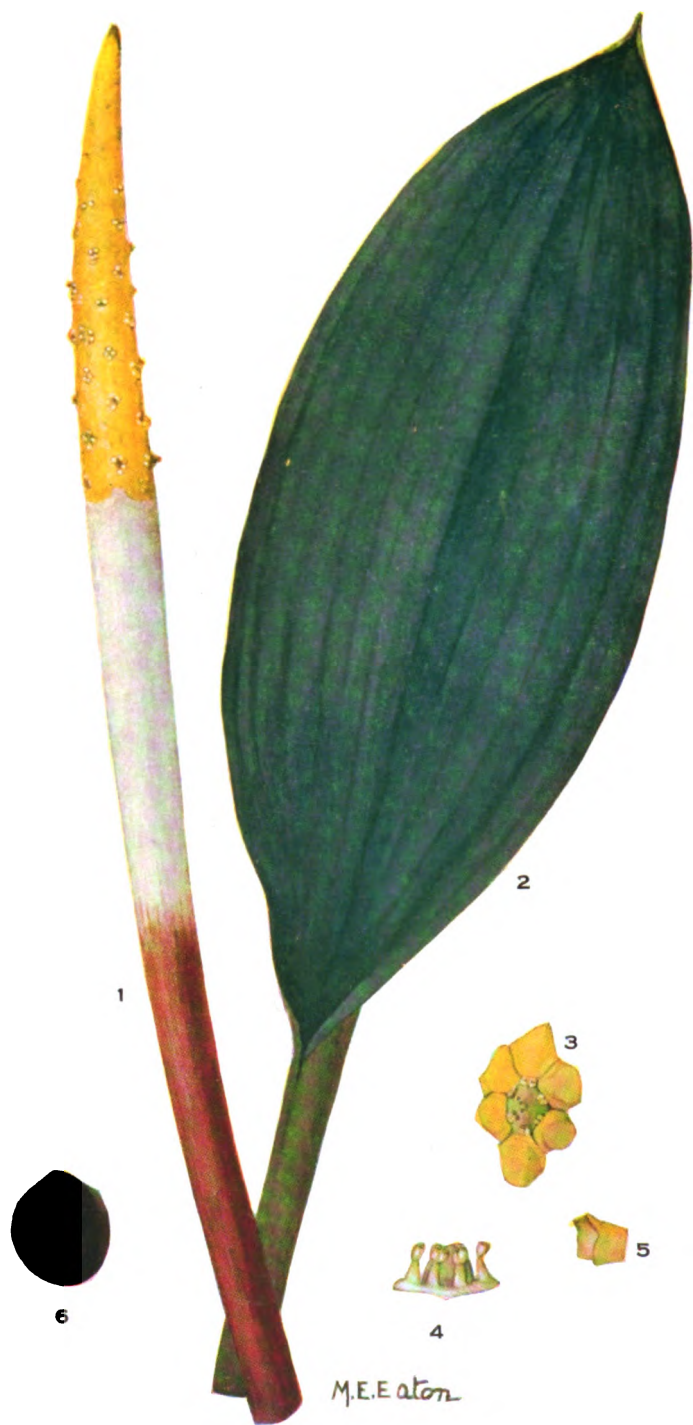
slender, and the bisymmetrically irregular form of each, its contrast of color—the lavender-violet changing abruptly to the white tip—and the densely yellow beard of the projecting sterile filament, make a study of artistic interest. No beard-tongue has a narrower throat than this.

The hairy-stemmed beard-tongue is a native of the northeastern states from southern Vermont to Virginia and west to southern Michigan and Kentucky. It grows in dry fields, barren or sandy, and, at least in the eastern portion of its range, is found only at scattered stations. It is not an aggressive plant of cultivated pastures and meadows as is *P. Digitalis*, and hence is more rarely seen. This is the only species of *Penstemon* native to the region near New York and Philadelphia.

That this is a plant easy of cultivation our experience here at the New York Botanical Garden has proved. We have long grown this species in an open bed, with ordinary loam soil, and it is from such plants, of uncertain derivation, that the accompanying drawing has been made.

FRANCIS W. PENNELL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Flower opened. Fig. 3.—Anther, front view, $\times 6$. Fig. 4.—Anther, rear view, $\times 6$. Fig. 5.—Anther, after opening, $\times 6$. Fig. 6.—Fruit. Fig. 7.—Seed, $\times 8$.



ORONTIUM AQUATICUM

ORONTIUM AQUATICUM**Golden-club***Native of the southeastern United States***Family ARACEAE****ARUM Family***Orontium aquaticum* L. Sp. Pl. 324. 1753.

An aquatic plant with the thick rootstock buried in the mud, the leaves ascending or floating, according to the depth of the water, and a slender round scape terminated by a cylindric golden spadix. The leaves have petioles sometimes two feet long, or often only a few inches long; the blades are oblong-elliptic, entire, acute or cuspidate at the apex, acute at the base, deep blue-green or dull green above, pale beneath, up to twelve inches long and five inches wide. The scape is up to two feet long in deep water, and is somewhat flattened near the spadix. The spathe is two to four inches long and encloses the spadix when young, but soon falls away or remains as a sheathing bract at its base. The spadix is one to three inches long, cylindric, acuminate above, and is a quarter to three eighths of an inch in diameter, becoming much thickened in fruit. The flowers, of a bright yellow, are perfect, and are densely crowded on the spadix. The perianth-segments are four to six (the lower flowers usually with six, the upper with four), and are imbricate over the ovary. The stamens are as many as the perianth-segments; the linear filaments are wider than the small anthers. The obtusely angled ovary is one-celled, depressed, partly immersed in the axis of the spadix, and contains a single ovule. The fruit is dark green, nearly globose, and about a half inch in diameter.

An odd member of the arum family, to which also belongs the jack-in-the-pulpit. The family has in the temperate regions comparatively few representatives, but in the tropics it is widely distributed, some kinds forming robust vines which climb tall trees, often so entangling the surrounding vegetation as to make tropical forests all but impenetrable. The genus *Orontium* contains but a single species, which is found inhabiting swamps, ponds, and streams from Massachusetts to central Pennsylvania, and south to Florida and Louisiana, mainly near the coast. It is sometimes known as floating arum, water-duck, and tawkin. It is an attractive plant for water or swamp gardens. The plant from which the illustration

was made has been in the aquatic house of Conservatory Range 1, New York Botanical Garden, since 1909.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering scape. Fig. 2.—Leaf. Fig. 3.—Flower, upper view, $\times 3$. Fig. 4.—Flower, perianth removed, $\times 3$. Fig. 5.—Perianth-segment, $\times 3$. Fig. 6.—Fruit.



ECHINOPSIS LEUCANTHA

ECHINOPSIS LEUCANTHA

White Torch-thistle

Native of Argentina

Family CACTACEAE

CACTUS Family

Echinocactus leucanthus Gillies; Salm-Dyck, Hort. Dyck. 341. 1834.*Cereus leucanthus* Pfeiff. Enum. Cact. 71. 1837.*Echinopsis leucantha* Walp. Repert. Bot. 2: 324. 1843.

Plants solitary, globular to oblong, often more than a foot high, usually overtopped by the long connivent spines; the ribs are twelve to fourteen, with the spines eight to ten in each cluster, brownish, the central one usually longer and more or less curved. The flowers are very large for the size of the plant, six inches long or more, with a long slender tube, bearing small scales with tufts of hairs in their axils. The spreading petals are oblong, obtuse, about one inch long, the outer ones pinkish, the inner ones nearly white.

This cactus has a rather wide distribution in western and central Argentina and shows a great variation in form; several types have been described as distinct.

In the living collections of the New York Botanical Garden are several plants of this genus collected by the writer in Argentina in 1915, a number of which have flowered. The plants do well in cultivation and flower freely each spring. The one here illustrated flowered in April 1918; it was obtained in the Andes, west of Mendoza near Portrerillos in 1915.

The plant has several English names, the one here adopted having been used by Lindley.

The genus *Echinopsis* as we now understand it is characterized by one-jointed stems, which are globular or more or less elongate, by slender funnelform flower-tubes, by short perianth-segments and by hairs in the areoles on the ovary and flower-tube. The flowers are similar to those of *Trichocereus* but the habit is very unlike the typical species of that genus.

We now recognize about twenty-five species, all native of South America, east of the Andes.

J. N. Rose.



VIBURNUM LANTANA

VIBURNUM LANTANA**Wayfaring Tree***Native of Europe, the Caucasus, and northern Africa*

Family CAPRIFOLIACEÆ

HONEYSUCKLE Family

Viburnum Lantana L. Sp. Pl. 268. 1753.

An upright shrub or small tree, sometimes twenty feet tall, with ascending branches. The young branches are densely pubescent with brown stellate hairs, becoming glabrate when older. The leaves are opposite, with petioles commonly a half inch long or less, sometimes longer, densely pubescent with stellate hairs; the blades are ovate, oval, or oblong-ovate, often cordate at the base, acute at the apex, up to three inches long and two inches wide, or sometimes broader on the new shoots; the upper surface is sparingly pubescent with stellate hairs, the lower surface densely so, especially on the nerves where the hairs are shorter and brown; the margin is denticulate, and the secondary nerves terminate in the teeth. The white flowers are in dense cymes, two to three inches across, of usually seven rays which are densely pubescent with stellate hairs. The corolla is about a quarter of an inch wide, its lobes broadly oval or orbicular and rounded at the apex. The stamens are five. The fruit is oblong-ovoid, about three eighths of an inch long, at first red, later changing to almost black.

An attractive plant in both flower and fruit, its showy clusters of white flowers appearing in May in the vicinity of New York city, the fruit ripening in late August or early September and persisting for some time. It will grow in any ordinary soil, but is especially suitable for drier situations and for limestone soils. The specimen from which our illustration was prepared has been in the fruticetum collection of the New York Botanical Garden since 1897.

Many of the most attractive and striking of our ornamental shrubs are to be found in this genus, which comprises about one hundred and forty known species, distributed in the temperate and subtropical regions of the northern hemisphere, the East Indies, the Andean region of South America, and the West Indies. They may be found in woodland and open, in low land and high, and in dry and wet situations, so that from this genus may be selected shrubs for almost any environment. They are excellent for borders or shrub groups, or for planting along roadsides or paths, their white flowers and the bright red fruits of some of the species making

them objects of great beauty. Of the kinds with red berries *Viburnum Opulus*, *Viburnum dilatatum*, and *Viburnum Wrightii* may be mentioned. Some of the others, such as *Viburnum tomentosum*, *Viburnum Sieboldii*, and *Viburnum Lantana*, have fruit which is red at first, later changing to black, so that they too present a period of bright color in the landscape. *Viburnum tomentosum* has in its flower clusters a number of showy sterile flowers, giving to the bush in bloom an unusual decorative effect, the clusters appearing as small tables of white among the mass of green. Of great decorative value are *Viburnum Opulus sterile* and *Viburnum tomentosum plenum*, with balls of white made up of masses of sterile flowers; the first of these is known as the guelder rose or snowball, the other as the Japanese snowball. While most of the hardy species are deciduous, one, *Viburnum rhytidifolium*, from central and western China, is evergreen, and has proved hardy as far north as Massachusetts. The only one of the hardy species with a striking fragrance is *Viburnum Carlesii*, from Corea, which has also proved hardy as far north as Massachusetts. A dwarf form is *Viburnum Opulus nanum*, which usually forms a compact little shrub of rounded outline. Some are greenhouse shrubs, such as *Viburnum Tinus*, commonly known as laurustinus, and *Viburnum odoratissimum*. One of the best for shady rocky situations is *Viburnum acerifolium*, the dockmackie of our own eastern woodlands, where it often forms large masses, its maple-like leaves giving it an appearance quite unlike others of the genus. Propagation may be effected by seeds sown in the fall or stratified, or by greenwood cuttings under glass.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Fruiting branch. Fig. 2.—Flowering branch.



CENTAUREA MONTANA

CENTAUREA MONTANA**Mountain Bluet***Native of Europe*Family **CARDUACEAE****THISTLE** Family*Centaurea montana* L. Sp. Pl. 1911. 1753.

A stoloniferous perennial plant, with tough roots and rootlets. The stems are one to two feet high, green, covered with short stiff hairs, especially above, markedly five-angled, the angles running up into winged bases of the strongly decurrent upper leaves; these are lanceolate, acute, lightly dentate, and hairy, almost woolly beneath, deep green above and light green beneath, and vary in length from two to eight inches. The basal leaves are sessile, narrowed at the base, and up to one foot long. The flower-heads are terminal or on short peduncles in the axils of the upper leaves, one or two inches in diameter, and blue to purple. The involucre are turbinate, consisting of about six rows of triangular, acute, green bracts, purple near the tips, with black, ciliate, straw-like margins. The blue-purple ray flowers have tubular, unequally five-lobed ligules, the lobes spreading. The red-purple disks, with the black stamens prominent, are composed of many perfect, tubular, lobed flowers. The achenes are smooth and cylindric, the pappus of many series of bristles.

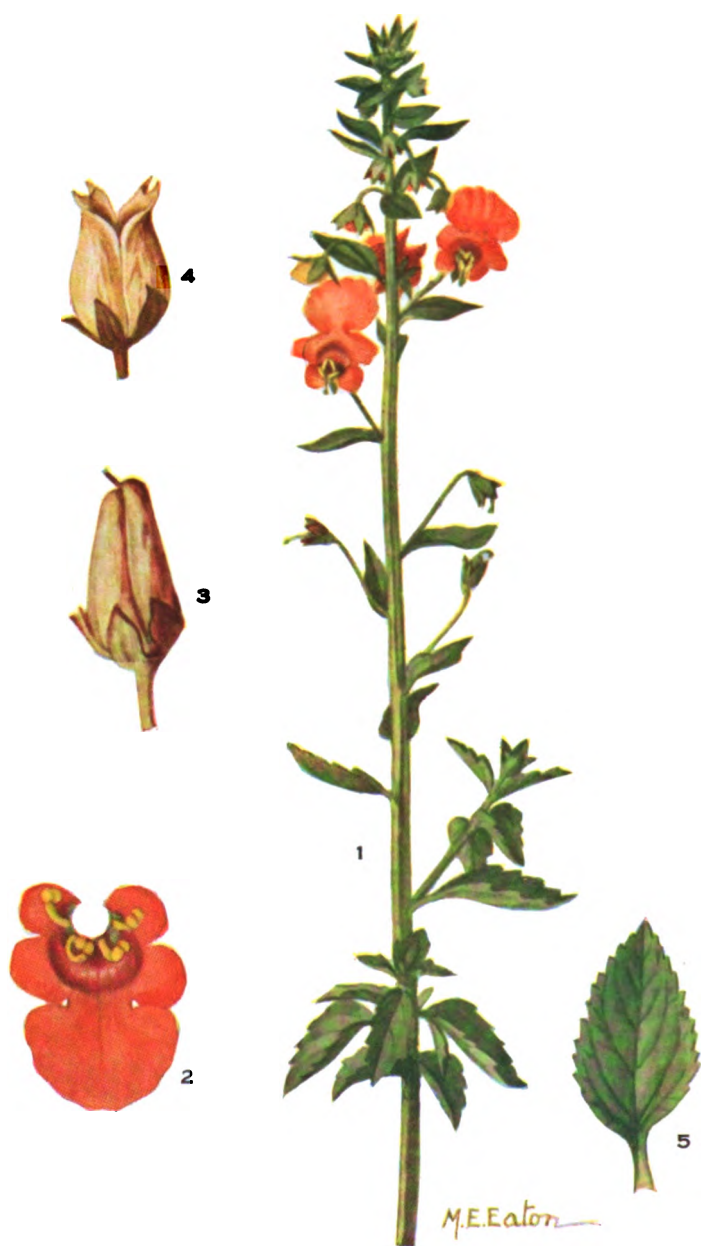
The genus *Centaurea*, with more than three hundred species, has contributed freely to our gardens. We have the corn-flower, *C. Cyanus*; the knapweeds, *C. nigra* and others; *C. americana*, a large, yellow-flowered native annual, always popular; and many interesting European and Asiatic species.

Centaurea montana, one of our common garden perennials, has been cultivated for centuries. Aiton, in the Hortus Kewensis, says it was grown by Gerard, as early as 1596. There are several varieties, *alba*, *rosea*, and *citrina*, in cultivation, being white, pink and yellow forms. A few plants furnish hundreds of blooms in early summer; then in September they renew their growth and bloom for another month or two. This is one of the easiest of plants to grow, often spreading rapidly and covering space not intended for it.

The illustration was taken from plants growing in the flower-borders of the New York Botanical Garden since 1913.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Ray-flower. Fig. 3.—Disk-flower.



ALONSOA MERIDIONALIS

ALONSOA MERIDIONALIS**Little Cascabel***Native of the Colombian Andes***Family SCROPHULARIACEAE****FIGWORT Family***Scrophularia meridionalis* L.f. Suppl. 280. 1781.*Alonsoa meridionalis* Kuntze, Rev. Gen. 457. 1891.

A perennial glabrous herbaceous plant, its slender stems and branches terminating in long racemes of dull orange flowers. The stems are erect, two to three feet tall, and sharply four-angled. The leaves are opposite, each pair remote and placed at right angles to the pair next below; their blades are ovate, acute, coarsely serrate or dentate, pale green beneath, and narrowed to slender petioles. The slender racemes bear many flowers, each on a slender upcurved pedicel. The five sepals are slightly united at the base; each is oblong, acuminate at apex, and with three longitudinal veins. The small corolla, only three eighths of an inch long, is very irregular, but symmetric; the tube is short, with the lobes abruptly and widely spreading, the two posterior ones are very short, and the tube split to the base between them; the two anterolateral lobes are ovate, rounded, of medium size, and project laterally, while the single anterior lobe, united with these for half its length, projects into a broadly rounded free portion. The corolla is dull orange, but, within, the tube is yellowish green. The four dull yellow filaments are short, and the anthers are conspicuous by reason of the membranous dilated yellow sac. The style is stout and glabrous, and the green stigma is slightly enlarged and capitate. The capsules are glabrous, narrowly urn-shaped, one third of an inch long, and open by a slit which divides the septum, or wall separating the two cells. The placentas project into each cell and bear many small, oval, black, ridged seeds which escape through the necklike capsule-mouth. The dead stems persist, and the seeds are scattered in the wind, in the manner characteristic of plants called tonoboles.

The little cascabel is a weed-like plant of waysides in the upper Eastern Andes of Colombia. It appears to be native there, and doubtless occurred about the dwellings of the Chibchas in the days of their prosperity, as now it grows about the little hovels of their descendants. The genus is South American, some species occurring in nearly all sections of the Andes, and one even in Central America and southern Mexico. The Spanish name, of which little cascabel is an adaptation, "Cascabelito," means little rattlesnake, and was

doubtless given in allusion to the sound of the seeds rattling in the pods on the dry fruit-stalks.

Like many genera of the figwort family, *Alonsoa* shows an interesting special modification of a primitively regular five-lobed corolla and five-stamened flower. The splitting between the posterior lobes, with the great reduction of these, and the development of the anterior half of the corolla accentuate a tendency frequent through the family.

This plant may be grown in loam soil in greenhouses. Its weed-like character as a native is evidence of easy culture. Our drawing has been made from a plant grown at the Garden, the seed having been collected by myself at Bogotá, Colombia, September 22, 1917.

FRANCIS W. PENNELL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Corolla, $\times 2$. Fig. 3.—Fruit, $\times 3$. Fig. 4.—Fruit, showing dehiscence, $\times 3$. Fig. 5.—Lower stem-leaf.

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ADDISON BROWN FUND

"the income and accumulations from which shall be applied to the founding and publication, as soon as practicable, and to the maintenance (aided by subscriptions therefor), of a high-class magazine bearing my name, devoted exclusively to the illustration by colored plates of the plants of the United States and its territorial possessions, and of other plants flowering in said Garden or its conservatories; with suitable descriptions in popular language, and any desirable notes and synonymy, and a brief statement of the known properties and uses of the plants illustrated."

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LEUCOTHOE CATESBAEI

LEUCOTHOE CATESBAEI

Dog-laurel

Native of the southern Appalachians and adjacent highlands

Family ERICACEAE

HEATH Family

Andromeda Catesbaei Walt. Fl. Car. 137. 1788.

Leucothoe Catesbaei A. Gray, Man. ed. 2. 252. 1856.

An evergreen shrub two yards tall or less, with glabrous or sparingly fine-pubescent twigs. The stems and branches are pliable, often switch-like, recurved or reclining, leafy, smooth, and sometimes slightly zigzag. The persistent leaves are alternate and more or less distichously spreading. The blades are leathery, lanceolate to narrowly elliptic, two and a half to six inches long, serrate with spine-tipped teeth, acuminate at the apex, and acute to rounded at the base; they are dark-green, with impressed veins, and ultimately glabrous above, but pale, with raised veins, and permanently pubescent with scattered hairs beneath. The petioles are stout, about half an inch long or less, closely fine-pubescent on the upper side, with buds for the next season early developed in their axils. The nodding, sessile panicles are raceme-like, narrow, one and one half to three and one half inches long, and densely flowered. The rachis of the panicle is stout, and is minutely and closely pubescent, at least in anthesis. The flower-stalks are over an eighth of an inch long, each subtended by an ovate-reniform bract, which is glandular-ciliate with black hairs and about an eighth of an inch long. The two bractlets at the base of the flower-stalk are similar to the bract, but smaller and thinner. The five-lobed calyx is persistent; the lobes are lanceolate to ovate, obtuse or acute, about one tenth of an inch long, eciliate, and several-veined. The corolla is white or pinkish, urceolate, about a quarter of an inch long, with ovate to reniform, recurved short lobes. The ten erect stamens are included in the corolla and are usually about one half as long as its tube. The subulate-lanceolate filaments, alternately long and short, are one sixteenth to a tenth of an inch long, glabrous, and unappendaged. The ellipsoid anthers, about one sixteenth of an inch long, are attached to the filament about the middle of the back, awnless but bimucronate at the apex where the sacs are open to shed the pollen, and rounded at the base. The ovary is globose or depressed, five-lobed, five-celled, and glabrous. The columnar style is several times longer than the ovary, glabrous, and straight, with the stigma discoid, but only slightly wider than the diameter of the style. The capsule is depressed-globose, about one fifth of an inch wide, seated in the persistent calyx, and glabrous, each valve with a median channel. The minute seeds are irregular in size and shape, and granulose.

This is the shrub that particularly attracts the attention, any time of the year, along the highland trails and watercourses in the southeastern United States. It is a striking and elegant shrub. The conspicuous pliable and arching branches, furnished with numerous glossy leaves, form beautiful banks of greenery.

In addition to the evergreen foliage, the dog-laurel presents three stages of the inflorescence, some one of which, at least, is prominent at each season of the year. Of course, during the period of flowering, late spring, the inflorescence is most conspicuous. However, previous to this, in the winter and the early spring, the precocious panicles, in bud, lend variety to the foliage, and later, in the summer and fall, the long clusters of plump seed-pods are quite prominent among the leaves.

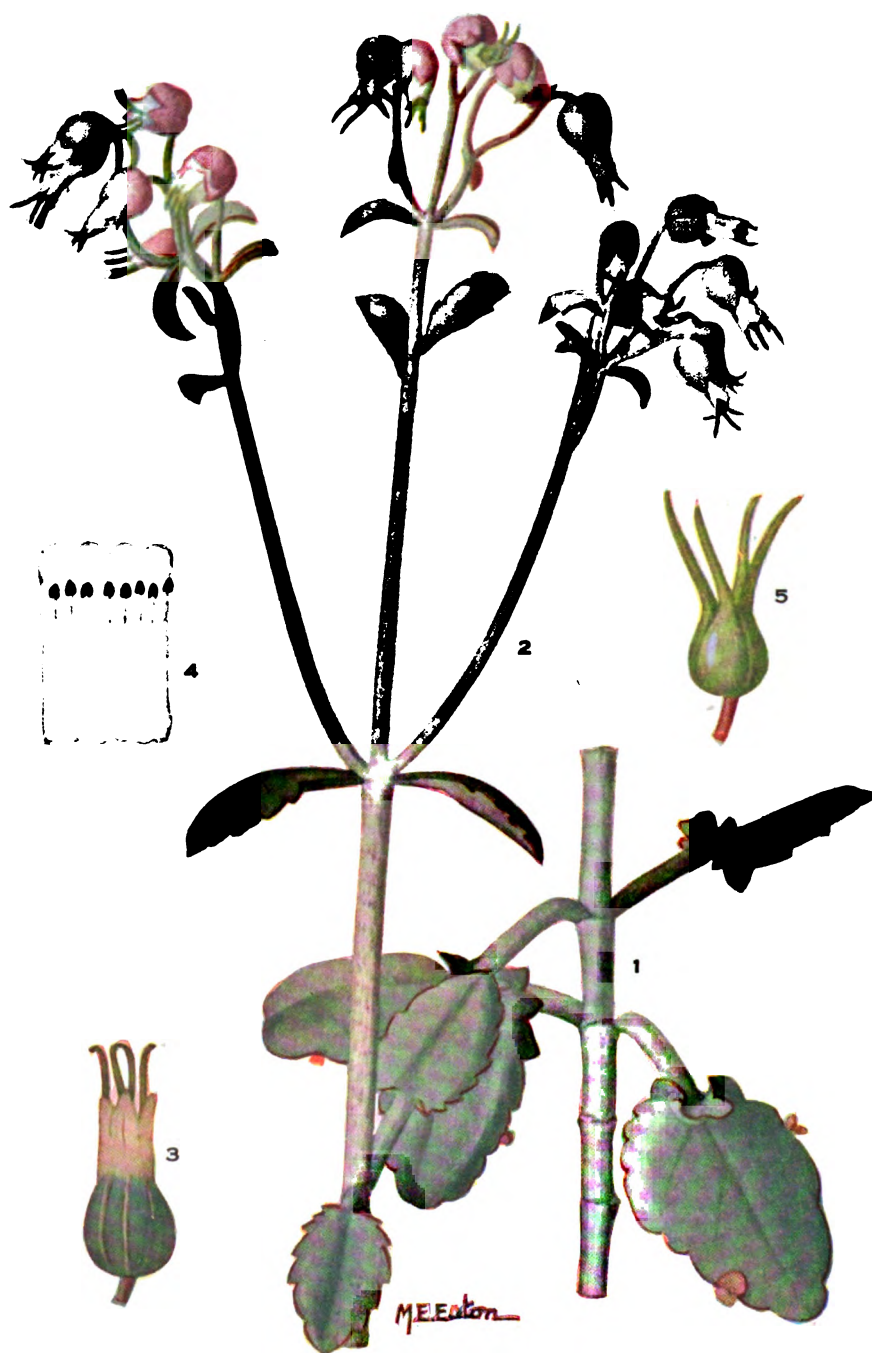
The southern mountains and the adjacent plateaus have been the source of many kinds of shrubs useful for ornamental cultivation, both in America and Europe. Perhaps nowhere else in temperate North America have in the past so many celebrated European plant collectors searched for novelties to be grown in the Old World gardens. Some of these collectors were sent out by private enterprise, while others went under government patronage. Notable among them were John Lyon, the Frasers, and the Michaux. In passing, it may be mentioned that American collectors were not wanting. John Bartram, the first native American botanist, heads the list.

The dog-laurel was introduced into European gardens in the latter half of the eighteenth century. Apparently it was first cultivated in an English nursery in 1794, from seeds sent from America by Michaux. It is now widely cultivated as an ornamental shrub, and quite justly so, and is hardy far northward of the northern limit of its natural range which is in southwestern Virginia and Tennessee.

The specimen from which the accompanying illustration was made has been grown in the New York Botanical Garden since 1914.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Fall foliage. Fig. 2.—Flowering branch. Fig. 3.—Corolla opened, $\times 2$. Fig. 4.—Stamen, $\times 4$.



BRYOPHYLLUM CRENATUM

BRYOPHYLLUM CRENATUM**Madagascar Sprouting-leaf***Native of central Madagascar*

Family CRASSULACEÆ

ORPINE Family

Bryophyllum crenatum Baker, Jour. Linn. Soc. 20: 139. 1884.

A glaucous, succulent, glabrous perennial, usually two to three feet tall, sometimes larger, with crenate leaf-blades, and cymes of yellow flowers. The round stems are usually simple below and trichotomously branched above, with the internodes rather long and sometimes marked with purple. The leaves are opposite. The blades are fleshy, oblong or ovate-oblong, obtuse, shallowly and coarsely crenate, the lower ones two to three inches long, on petioles up to two inches long, cordate, two-eared by the usually incurved basal lobes; they are light green above, paler beneath, with three to five nerves on each side of the midrib which is prominent beneath; the floral leaves are much smaller. The cymes are corymb-like, and rather loosely flowered, with the pedicels slender and recurved. The nodding flowers are a half to two thirds of an inch long; the calyx is rose-colored, almost globose, with four deltoid teeth; the corolla is yellow, its tube about twice as long as the calyx, the four lobes with rounded tips. The eight stamens are included, in one series, inserted above the middle of the tube; the filaments are about a quarter of an inch long, with small anthers. The carpels are about a quarter of an inch long, with styles of about the same length.

This interesting succulent was discovered by Robert Lyall about ninety years ago. It grows well in the ordinary succulent house, and is of easy culture. The specimen from which the illustration was prepared was secured in an exchange with the Royal Gardens, Kew, England, in 1902.

The genus *Bryophyllum* contains five known species, all natives of Africa, although one, *Bryophyllum calycinum*, has become so widely distributed that it appears native in America and Asia.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Middle part of stem and leaves. Fig. 2.—Upper part of stem with cyme. Fig. 3.—Flower, calyx removed, $\times 3$. Fig. 4.—Corolla, split open exposing stamens, $\times 3$. Fig. 5.—Carpels, $\times 3$.



LILIUM HENRYI

LILIUM HENRYI**Henry's Lily***Native of central China*

Family LILIACEAE

LILY Family

Lilium Henryi Baker, Gard. Chron. III. 4: 660. 1888.

A herbaceous plant, with a large, reddish-brown, globular bulb three or four inches in diameter, of many oblong, fleshy scales. The stem reaches a height of from four to eight feet, is smooth, deep green, and bears about thirty leaves, and from one to twenty flowers at its summit. The lower leaves are about five inches long and one inch wide, sessile, acute, and prominently seven- or eight-veined, and have entire margins; the leaves toward the top of the stem successively are much shorter, the uppermost being nearly circular in outline; they are somewhat clasping at the base, acuminate, the tips being slightly recurved. The large flowers are on long branches, lack fragrance, and are mostly nodding. The six perianth-segments are lanceolate, reflexed and curved from their bases; they are apricot or orange-yellow in color, spotted with reddish-brown, keeled near their bases, in the center with glistening patches of green, on both sides of which are numerous yellow, club-shaped papillae. The six stamens, with green filaments, hang down two or three inches below the perianth-segments, curving outward from the style; the red-brown anthers are centrally attached. The style is nearly as long as the stamens, slightly curved, and the stigma indistinct. The capsule is large, with six prominent ridges, and contains many seeds.

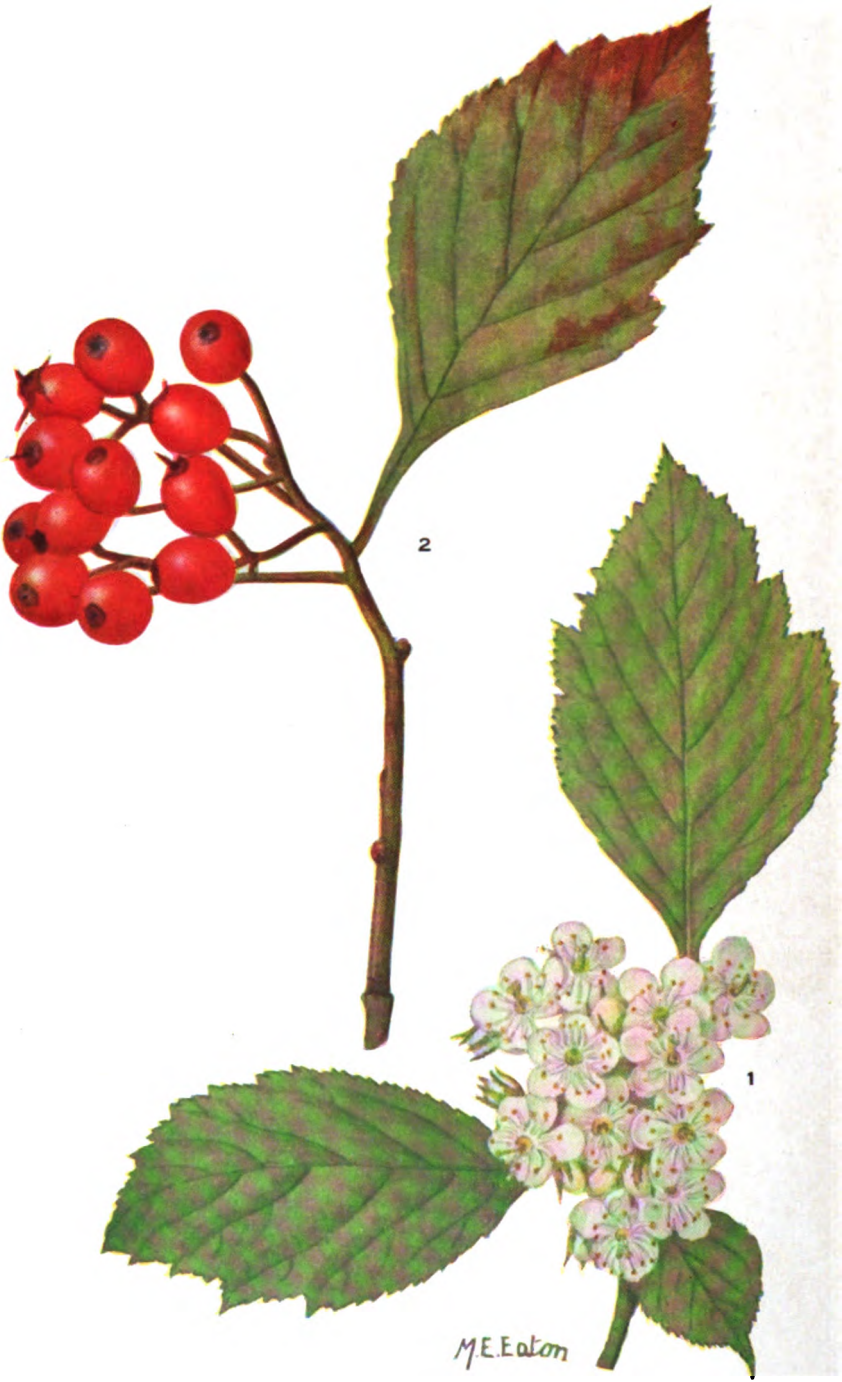
This lily, sometimes called the "yellow speciosum," because of its relation and similarity of form and habit to *Lilium speciosum*, was introduced into cultivation in 1898, flowering first in the Royal Gardens at Kew, England, from bulbs sent by Augustine Henry from the grassy slopes of Ichang, Western Hupeh, China, where he had first collected it a year before. Mr. E. H. Wilson says "Ichang is best known to horticulturalists as the home of the lovely *Lilium Henryi*."

While not deemed perfectly hardy, Henry's lily does well if planted with the protection of conifers or rhododendrons, as it likes a little shade and coolness at the roots. Green backgrounds also enhance its attractiveness, bringing out the contrast of orange, yellow-green centers, and reddish dots and anthers. This lily may be propagated not only by bulbs, but by seeds, which are produced abundantly.

Since 1914 a few specimens have flourished along the edge of a planting of conifers in the beds near Conservatory Range 1, in the New York Botanical Garden, and from one of these our illustration was prepared.,

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Upper part of flowering stem. Fig. 2.—Lower leaf. Fig. 3.—Capsule.



CRATAEGUS CALPODENDRON

CRATAEGUS CALPODENDRON**Pear Thorn***Native of the eastern United States***Family MALACEAE****APPLE Family**

Crataegus tomentosa Du Roi, Harbk. Baumz. 183. 1771. Not *Crataegus tomentosa* L. 1753.

Mespilus Calpodendron Ehrh. Beitr. 2: 67. 1788.

Crataegus Calpodendron Medic. Gesch. Bot. 83. 1793.

Crataegus Chapmani Ashe, Bot. Gaz. 28: 270. 1898.

Usually a tree up to twenty feet tall, its widely spreading branches forming a flat head, or sometimes only a shrub. The branchlets are at first tomentose, later becoming glabrous, and are commonly unarmed, or sometimes with slender straight spines an inch or two long. The nearly globular winter-buds have their protecting scales of a chestnut-brown color and ciliate on the margins. The leaf-blades are ovate, ovate-oblong, or rhombic-ovate, one and a half to three inches long and one to three inches wide; they are rather abruptly contracted below into the petiole and acute or acuminate at the apex; they are gray-green, turning scarlet or a brilliant orange in the autumn, with a pale persistent pubescence on the lower surface, puberulous and ultimately glabrous on the upper surface; the margins are commonly incisely lobed and are usually doubly serrate, except at the base. The flowers, about a half inch in diameter, are in broad flat-topped clusters which are pubescent and furnished with lanceolate bracts. The calyx-tube, or hypanthium, is obconic and tomentose. The persistent sepals, reflexed after flowering time, are lanceolate, acuminate, glandular-lancinate, and equal or somewhat exceed the erose white petals. There are ten to twenty stamens, with small pink anthers, and usually two or three styles. The fruit is pear-shaped or ellipsoid, rarely nearly globose, up to a half inch broad, orange-red or red, the flesh glutinous. The seeds have deep pits on their ventral surfaces.

This is a desirable decorative plant on account of the persistent fruit, which usually remains on the branches until the following spring, retaining essentially its bright color. The few spines also make it less aggressive than most species, a character appreciated by those who have tried to make an intimate acquaintance with some of the thorns. It is commonly found growing wild along forest borders or in the neighborhood of streams, from central New York and northeastern New Jersey to Minnesota and Missouri, with an extension southward in the mountains to northern Georgia. The

specimen from which the illustration was prepared has been in the collections of the New York Botanical Garden since 1903.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Fruiting branch.



ELAEAGNUS MULTIFLORUS

ELAEAGNUS MULTIFLORA

Goumi

Native of Japan and China

Family ELAEAGNACEAE

OLEASTER Family

Elaeagnus multiflora Thunb. Fl. Jap. 60. 1784.*Elaeagnus longipes* A Gray, Mem. Am. Acad. II. 6: 405. 1858.*Elaeagnus edulis* Sieb.; May, Rev. Hort. 1876: 18. 1876.

A much-branched shrub, up to six feet tall, the branchlets covered with reddish brown scales, the fragrant flowers yellowish white, in the leaf-axils, and the fruit scarlet. The leaves are alternate, with petioles a half inch long or less. The blades are up to two and a half inches long and an inch and a quarter wide, oval, elliptic, ovate, or obovate-oblong, the apex acute or rather abruptly acuminate, the base cuneate; the upper surface often has stellate hairs when young, later becoming glabrous; the lower surface is entirely covered with silvery scales, with a few scattered brown ones. The pendulous flowers are single, or in clusters of two or three, on pedicels, as long as themselves or longer, thickly covered with reddish brown scales. The perianth, thickly covered with scales, has a marked constriction toward the base, below which it is ellipsoid, above bell-shaped; it has four broadly ovate acute or somewhat obtuse lobes about as long as the tube. The four stamens have short filaments inserted near the mouth of the perianth. The style is linear, shorter than the perianth. The scarlet oblong fruit is pendulous, on pedicels as long as or longer than themselves, and ripens in July or August.

This shrub is attractive on account of its numerous odorous flowers, of a spicy fragrance, and its bright fruit which is usually borne in great abundance. It will thrive in almost any well-drained soil, preferring a sunny situation. The fruit has an agreeable slightly acid flavor, and might prove valuable for preserving. The specimen from which the illustration was prepared has been in the collections of the New York Botanical Garden since 1895, and was obtained from the Arnold Arboretum.

The genus *Elaeagnus* comprises about forty known species, found in the Mediterranean region and temperate and tropical Asia, with one species in temperate North America. Many of them are of great decorative value on account of their handsome foliage and striking fruit; the flowers, while inconspicuous, are usually fragrant. Almost any well-drained soil suits them, but a

sunny position is preferable; they will even grow in a limestone country. They may be propagated from seeds, which do not, however, germinate until the second year after sowing; a good plan is to stratify them the first year, sowing the spring of the second. They may also be propagated by cuttings of mature or half-ripened wood, or by layering. Grafting may also be resorted to for the variegated and rarer kinds, seedlings of species of vigorous growth being used for the stock.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Fruiting branch. Fig. 2.—Flowering branch. Fig. 3.—Flower, corolla opened, $\times 2$. Fig. 4.—Leaf.



BULBOPHYLLUM GRANDIFLORUM

BULBOPHYLLUM GRANDIFLORUM**Large-flowered Bulbophyllum***Native of New Guinea*

Family ORCHIDACEÆ

ORCHID Family

Bulbophyllum grandiflorum Blume, Rumphia 4: 42. 1848.

An epiphytic plant with creeping stems, one-leaved pseudobulbs, and a scape bearing a single large brownish flower. The pseudobulbs are prismatic, one to two inches long, narrowed upward, and are an inch or so distant on the stem. The leaf is oblong-elliptic, erect, up to ten inches long and one to two inches wide, with the apex obtuse or sometimes retuse, and narrowed at the base into a short stalk; it is of firm texture and shining. The scape, eight inches or a foot long, arises from the base of the pseudobulb, has usually two or three bracts, the upper one sheathing the flower-stalk, and bears on a curved stalk a large flower. The dorsal sepal, measuring four to five inches long and about two inches wide, is of a peculiar light greenish brown with a number of lighter spots between the nerves, chiefly on the lower part; it is oblong-ovate, obtuse, sickle-shaped, with the sides reflexed, and keeled on the back. The lateral sepals are linear-oblong, three and a half to four inches long and three fourths of an inch wide, lighter in color than the dorsal sepal and not spotted, and are deflexed and incurved. The light green petals are very small, about an eighth of an inch long, triangular, and acute. The three-lobed lip, whitish or pale green, is about a quarter of an inch long, laterally compressed in front but broader behind, the margins of the lateral lobes ciliate; it is attached underneath about the middle to the foot of the column, and is so delicately balanced that it trembles at the least touch; the terminal lobe is tongue-shaped, the upper surface being deeply grooved, the sides spotted with red. The column is short and stout. The anther is yellow and brown. The pollinia are four.

This is the largest member of the genus, and its right to this distinction is indicated by the specific name. It was discovered in New Guinea in 1828 by Zippel, a naturalist who accompanied an expedition commissioned by the Dutch government to establish a civil and military settlement in that archipelago. A peculiarity of this genus is the small size of the petals and lip as compared with the sepals, but in no other species is the contrast in this respect so great as in this, the exaggerated size of the sepals and the diminutive petals and lip being remarkable. For many years after its discovery it was known only in a wild state, but finally a specimen,

said to have been obtained from the Messrs. Lindley in 1887, flowered in the collection of Sir Trevor Lawrence, and was exhibited on March 26, 1895, at a meeting of the Royal Horticultural Society, under the name of *Bulbophyllum burfordiense*. It requires a hot humid house for its successful cultivation. The illustration was prepared from a plant which has been in the collections of the New York Botanical Garden since 1911.

The genus *Bulbophyllum* contains about five hundred known species, distributed for the greater part in tropical Asia, Africa, and Australia, with a few in New Zealand and America, although the American forms by some are considered a different genus. The flowers are usually small or of medium size, none of the others approaching this in the magnitude of its flowers.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Plant, showing creeping stem, pseudobulbs and leaves, and lower part of scape. Fig. 2.—Upper part of scape with flower. Fig. 3.—Column and portions of adjacent parts, front view, $\times 2$. Fig. 4.—Column, side view, $\times 2$. Fig. 5.—Anther, $\times 5$. Fig. 6.—Pollinia, $\times 5$.



FAGELIA DIVERSIFOLIA

FAGELIA DIVERSIFOLIA

Cut-leaved Slipperwort

Native of Colombia

Family SCROPHULARIACEAE

FIGWORT Family

Fagelia diversifolia Pennell, sp. nov.

A sparsely pubescent erect herbaceous plant, with deeply and variously cut leaves and lax corymbs of slipper-form yellow flowers. The roots are fibrous, but with a short tap-root. The stem is from one to three feet tall, branched above through the inflorescence, and is sparsely pubescent, especially about the nodes, with gland-tipped hairs. The leaves are pinnately lobed with two or three pairs of segments, irregularly doubly serrate-dentate, are green above and pale beneath, and with a scattered pubescence on both surfaces; they are very variable in the form of the segments and the depth of the cutting, this in the upper leaves reaching nearly to the midrib, in the lower being only a pronounced dentation. The inflorescence is ample and leafy-bracted throughout, appearing as if dichotomously branched with axillary pedicels; inspection shows that this inflorescence, which is characteristic of this genus, consists of a pair of terminal flowers at each joint, the branch or branches developing from buds axillary to the bract-leaves. The pedicels are about an inch long, and pubescent with gland-tipped hairs. The four sepals are ovate, acuminate, slightly serrate, and externally slightly pubescent and ciliate with gland-tipped hairs. The corolla, as throughout this genus, is remarkably modified; the posterior lip, composed of the two posterior lobes, remains as a very short arch, with a narrow slit-like orifice; the anterior lip or pouch, about half an inch long, is developed into a large inflated pendent pouch, nearly closed at its narrow orifice by an upgrowth of its anterior wall; above this orifice is a narrow neck at the widest part of which the corolla is abruptly hinged, the pouch projecting forward so that the concavity on its outer surface just below its orifice nearly closes against the posterior lip; the corolla is yellow throughout, and is slightly pubescent posteriorly both without and within. The stamens are but two, and lack the filament, the separated anther-sacs being borne on two arms of the connective; one sac, of a deep yellow, bears pollen, and is hid within the hood; the other sac, of a pale yellow, is sterile, and projects in such a manner that an insect, pushing into the orifice of the pouch, will hit it. This action, through the lever-like connective, forces the posterior sac out through the slit-like posterior orifice and dusts the insects back with pollen. The style matures after the anthers and is curved downward so that the stigma may be touched by the insect

visitant. The capsule is one third of an inch long, globose-pyramidal, obtuse, and pubescent with short gland-tipped hairs. The minute seeds, only about one fortieth of an inch long, are oblong, ridged, brown.

The type of this new species was collected on a moist bank at Chipaque, Department of Cundinamarca, Colombia, at an altitude of about 8700 feet, August 23, 1917, my number 1320, and is preserved in the herbarium of the New York Botanical Garden.

This plant is apparently a native of the upper eastern slopes of the Eastern Cordillera of the Andes; it was also collected by me at Ubague; and it is cultivated in gardens, in Colombia.

This, our first species to be illustrated in *ADDISONIA*, shows well the complexity of organization of the flower of *Fagelia*, or, as it has long been known, *Calceolaria*. It is difficult in such a corolla to see any vestige of an original series of five petals; moreover the stamens are not only reduced in number from five to two but these two are modified into an excellent mechanical device to bring about cross-pollination. That the complexity extends to other parts of the plant structure is shown by the paired terminal flowers (perhaps axillary by the suppression of two internodes), an inflorescence far removed from the indefinite racemes of simple axillary pedicels general in the figwort family. Its whole structure tells us that *Fagelia* is one of the most evolved of figworts, and that this section of *Fagelia*, possessing such divided anthers, is the most advanced of this large genus.

There are very many species of slipperworts, occurring in much diversity and abundance throughout the Andes mountain-system, with outlying species northward to southern Mexico, and in New Zealand. The genus is singularly plastic, and, as with the beard-tongues in North America, the mapping of the ranges of its different species will certainly give us a sensitive test for deciding areas of plant distribution.

Our illustration has been made from a plant grown at the New York Botanical Garden, from seed taken from the type specimen.

FRANCIS W. PENNELL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Corolla bent back to a flat position, and with main portion of pouch removed, $\times 2$. Fig. 3.—Stamens and base of corolla, $\times 3$. Fig. 4.—Calyx and immature capsule, $\times 2$.



EUONYMUS PATENS

EUONYMUS PATENS**Spreading Spindle-tree***Native of central China*

Family CELASTRACEAE

STAFF-TREE Family

Euonymus patens Rehder, in Sarg. Trees & Shrubs 1: 127. 1903.

A glabrous compact shrub up to ten feet tall, with spreading branches, semi-persistent chartaceous leaves, greenish flowers, and pink fruit. The grayish green young branchlets are obscurely four-angled and minutely warty; the winter-buds are ovate. The leaves are opposite, with petioles usually a quarter inch long or less. The blades are elliptic to oblong-elliptic, or sometimes obovate or obovate-oblong, up to three inches long and an inch and a half wide, with the apex acutish or somewhat acuminate, and the base cuneate; they are bright green on the upper surface, paler beneath, and have five or six pairs of ascending nerves; the margin is crenate-serrate. The flowers, a third to two fifths of an inch in diameter, are borne in loose upright cymes which are long-stalked, and are from two to four times dichotomously branched; the peduncles are up to one and a half inches long, and the pedicels commonly less than a half inch. The four sepals are nearly orbicular, and the four petals of similar shape, but about three times as long. The four stamens are a half to two thirds as long as the petals and are inserted below the four-angled disk. The pink capsules are about two fifths of an inch in diameter, nearly globose, and not lobed. The seeds are pinkish brown, and are entirely covered by the orange-red arils.

A shrub of decorative value on account of its semi-persistent foliage and handsome fruits. It grows well in any ordinary soil, and is hardy as far north as Massachusetts. It was introduced into the United States by George H. Hall, who had resided at Shanghai, China, for several years previous to 1860. It flowers in August and September, and ripens its fruit in October and November. The semi-persistent character of the leaves in the neighborhood of New York city would indicate that further south it would be an evergreen. It is usually cultivated in American gardens and offered for sale in nursery catalogues under the incorrect name of *Euonymus Sieboldians*. The specimen from which the illustration was prepared has been in the collections of the New York Botanical Garden since 1911.

GEORGE V. NASH.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Flower, $\times 2$. Fig. 3.—Fruiting branch.



POINSETTIA HETEROPHYLLA

POINSETTIA HETEROPHYLLA**Fire-on-the-mountain***Native of the central and western United States*

Family EUPHORBIACEÆ

SPURGE Family

Euphorbia heterophylla L. Sp. Pl. 453. 1753.*Poinsettia heterophylla* Klotzsch & Garcke; Klotzsch, Monatsb. Akad. Berlin 1859: 253. 1859.

An annual, bushy herb, one to four feet high, with a milky, acrid juice. The stems are erect, green, glabrous, and bear many leaves and red-blotched bracts subtending closely-clustered involucre. The leaves are alternate, bright green, slender-petioled, and extremely variable in shape; the lower ones are ovate, wedge-shaped at their bases, acuminate, with sinuate-dentate margins; the upper ones are nearly as large, mostly fiddle-shaped, and variously toothed, often red-blotched near the base. The bracts subtending the clusters of involucre are small, lanceolate, acute, and with showy bright red areas near their bases. The involucre, resembling perianths but actually containing the reduced staminate and pistillate flowers, are in dense clusters, closely surrounded by the red bracts; they are green and cup-shaped and have four fimbriate lobes with usually one rarely four small green glands, without petal-like appendages, on the sinuses. The four stamens are short and thick, with bright green anthers. The ovaries, on short stalks, bearing three-parted spreading stigmas, quickly ripen into three-lobed capsules containing three cream-colored tuberculate seeds.

The fire-on-the-mountain, or annual poinsettia, as this spurge is sometimes called, while lacking showy floral parts, has, in common with our Christmas poinsettia, the conspicuous red markings, although not of such vivid hue. It is a valuable summer-flowering plant, a companion to our snow-on-the-mountain (PLATE 86), which has white bracts.

This plant was introduced into cultivation about 1885, through American seedsmen. If cut back early in the season, it will make a strong bush for summer color. Propagation is effected by seeds sown in the open ground in spring, or better by sowing the seeds in a coldframe or greenhouse in March. The young plants should be pinched back so they will branch freely and become stocky.

Our illustration was made from specimens growing in the border of the New York Botanical Garden, where many are raised each year from seed.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Upper part of flowering stem. Fig. 2.—Leaf. Fig. 3.—Involucre, with flowers, $\times 3$.



PENSTEMON TENUIFLORUS

PENSTEMON TENUIFLORUS**Slender-flowered White Beard-tongue***Native of the central Mississippi Valley*

Family SCROPHULARIACEÆ

FIGWORT Family

Penstemon tenuiflorus Pennell, sp. nov.

A finely pubescent herbaceous plant, from a short rootstock sending up usually but one stem, terminating in a panicle of very slender white flowers. The erect stems, finely pubescent with scattered minute white hairs, are one to two feet tall. The leaves of the winter rosette, persisting at the base of the stem until the flowering season, are about four inches long, the petiole nearly equaling the ovate blade; the stem-leaves are lanceolate and sessile, clasping by a rounded base; all are softly pubescent with minute rather sparse hairs, light green, scarcely paler beneath, and with obscurely serrulate margins. The panicle, less than one third the height of the plant, is rather secund, lax and composed of but three or four nodes; the branching is as in *P. Digitalis* (PLATE 130); its bracts throughout are very much smaller than the leaves and not at all conspicuous; stems, pedicels, and calyces are pubescent with gland-tipped hairs. The peduncles are usually well developed, frequently an inch in length, although the pedicels are short. The sepals are ovate, acute, with slightly erose scarious margins, and are about one seventh of an inch long. The corolla is slightly over one inch long, its form as narrow as in *P. hirsutus* (PLATE 45); its throat is gradually slightly inflated, narrowly arched and keeled above, flattened and strongly two-ridged within, while at its mouth it is nearly closed by the upraised base of the anterior lip; the posterior lip is formed of two lobes which are united and arched about two thirds their length, beyond which their free portions are erect-recurved; the anterior lobes are longer, spreading; the corolla is white, only faintly tinged externally and on the margins of the lobes with violet, and has no lines of deep color within the throat; externally it is finely pubescent with gland-tipped hairs, and within, over the bases of the anterior lobes and on the two ridges within the throat, it is strongly pubescent with yellow hairs. The stamens are essentially as in *P. hirsutus*, the anther-sacs narrower and always glabrous. The sterile filament is densely bearded distally with short lemon-yellow hairs. The capsule has not been seen.

The type specimen was collected in loam soil in open pineland, three miles southeast of Albany, Morgan County, Alabama, on May 27, 1917, my number 9753, and is preserved in the herbarium of the New York Botanical Garden. The species is known to occur from Illinois to northern Alabama, and in central Oklahoma.

The history of the specimen from which our drawing has been prepared is the same as that outlined for *Penstemon calycosus* (PLATE 136). The plant, placed in the soil in the summer of 1917, survived the ensuing severe winter, flowered in 1918, but died without producing seed.

It is surprising to find in the supposedly well-known flora of the central portion of the United States a beard-tongue of the striking distinctness of this, and moreover one scarcely known to collectors. Like others of this genus, this species when seen in flower is very distinct from its allies, but dried specimens, which have lost their color and color-pattern and even much of the corolla form, are more difficult of interpretation. Its alliance is certainly with *Penstemon hirsutus*, from which the white flowers and the minute pubescence distinguish it. It is most likely to be confused with Small's *P. pallidus*, but that species has much more densely pubescent leaves and smaller corollas, the white of which is broken, within the throat on its lower side, by many longitudinal fine lines of violet-blue.

FRANCIS W. PENNELL.

EXPLANATION OF PLATE. Fig. 1.—Flowering stem. Fig. 2.—Corolla opened $\times 2$. Fig. 3.—Anther, front view, $\times 5$. Fig. 4.—Anther, rear view, $\times 5$. Fig. 5.—Portion of stem and leaves.

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